MACHINE TOOL BLUE BOOK

MARCH 1946

Announcing

NEW FLOATING TAP HOLDER

...TS ...AP IN AND OUT

Here's a holder that will not freeze under tension caused by drag of tap. It corrects both parallel and angular misalignment.

Because of those two features and because there are no springs or pivot members to restrict float, no bell mouths can occur and you're always sure of a straight hole. Close tolerances on tapped hole are easier to hold. Amount of float is infinitely variable and simply adjusted by lock nut.

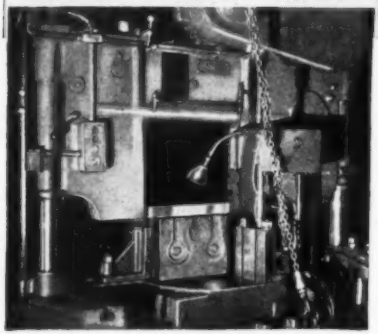
AVAILABLE WITH STRAIGHT OR TAPERED SHANK IN FOUR SIZES:

2" body for standard taps, $\frac{3}{16}$" to ½" incl.
2½" body for standard taps, ½" to 1¼" incl.
3" body for standard taps, 1¼" to 1¾" incl.
4" body for standard taps, 1¾" to 2½" incl.

EMPIRE TOOL COMPANY

8774 GRINNELL AVE. DETROIT 13, MICH.

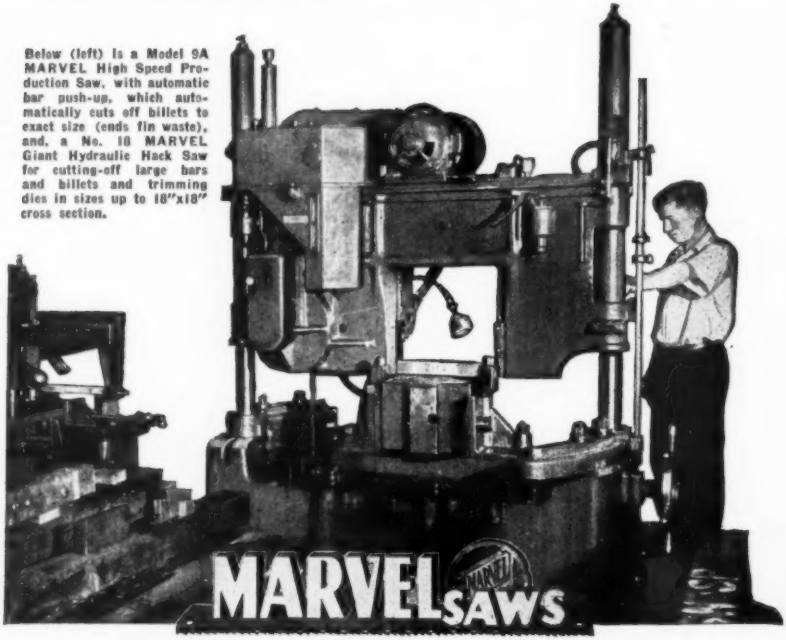
Marvel Saws Cut off Hours from Die Maintenance Time



Hubbard & Company, Pittsburgh, manufacturers of pole line hardware, picks, hammers and other drop forged specialties, use MARVEL Saws to eliminate tedious hours in making and maintaining their giant forging dies. Not only do these saws do all regular cutting-off of steel for the machine shop, die blocks for die shop and exact size billets for the forge shop, they also materially cut the cost of die maintenance.

Previously, it was necessary to plane the face of dies being reworked. This was a long and tedious job because the die face is always work-hardened with hard spots that had to be chipped or ground out before the planer tool could make a cut. Now with MARVEL Saws, the face of a die is speedily and accurately "skinned"—a thin slice is sawed off just behind the hard spots, after this speedy "skinning" and a single facing cut on the planer, the die is ready for the die sinker. This modern MARVEL method is saving Hubbard a lot of dies, materials, labor and machine time.

Below (left) is a Model 9A MARVEL High Speed Production Saw, with automatic bar push-up, which automatically cuts off billets to exact size (ends fin waste), and, a No. 18 MARVEL Giant Hydraulic Hack Saw for cutting-off large bars and billets and trimming dies in sizes up to 18"x18" cross section.



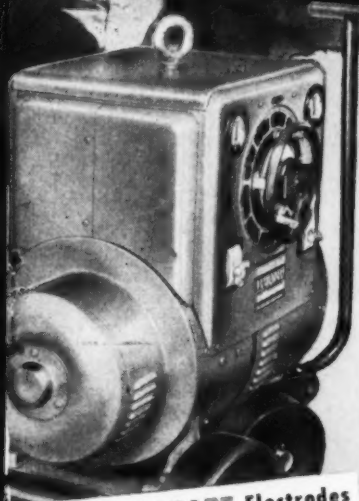
ARMSTRONG-BLUM MFG. CO.

5700 Bloomingdale Avenue *"The Hack Saw People"* **Chicago 39, U. S. A.**

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

a whole army will vouch for . . .

Hobart's



simplicity, speed and efficiency

Army veterans know all about Hobart "Simplified" Arc Welders from practical experience . . . the weldors can tell you about the ease in securing the correct welding heat; about its simplified operation . . . others tell you how fast the welding jobs were turned out; how strong and tough were the welds. Hobart will do this on your work, too, regardless of what type of arc welding work you have in mind.

Look at Hobart's Features

The Multi-Range Dual Control gives you a choice of 1000 combinations of welding heat, instantly available. The Remote Control feature allows you to adjust welding current regardless how far the machine may be from the work. Other features offer greater welding ease and more years of useful operation. Check coupon for details.

"Practical Design for Arc Welding"

Three volumes of detailed arc welding design short-cuts, especially for weldors, engineers, designers. Each volume $3.50, or all three for $10.00.

Practical Arc Welding

Lessons in Arc Welding

You'll like HOBART Electrodes

Precision built and inspected, you'll soon find Hobart Electrodes to be your favorite. They're made in a modern plant, completely equipped with the newest machinery. There's a size and type for every welding job . . . for all types of metal. Write for details.

HOBART BROTHERS CO., BOX TB-36 TROY, OHIO

"One of the World's Largest Builders of Arc Welders"

REACH FOR YOUR SCISSORS!

HOBART BROTHERS CO., BOX TB-36 TROY, OHIO

Without obligation, please send details about Hobart "Simplified" Arc Welding, also items checked below:

☐ _____Volumes of "Practical Design for Arc Welding," $_____enclosed.

☐ "Lessons in Arc Welding," $0.75 enclosed.

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Free!

☐ "Vest Pocket Guide for Weldors"

Name.....

Firm.....

Address.....

HOBART

ONE OF THE WORLD'S LARGEST BUILDERS OF ARC WELDERS

PRECISION

- Dynamically balanced design.
- Guaranteed to turn or bore within .0002" dia. in five inches.
- Self-centering collet work-holding method.
- Vibration-free ball-bearing spindle.
- Positive turret re-indexing within .0003".

VARIETY

- Eight successive operations finish-machined at one chucking.
- Internal or external thread chasing.
- Double tool slide for straight or taper turning, forming or cutting off.
- Uses push-out or draw-in collet, step or jaw chuck.

EASE OF OPERATION

- Single lever spindle speed control.
- Self-locking turret head.
- Positive stops for duplicating size.
- Vee-belting replaceable without disturbing spindle or drive.
- Automatic brake; pneumatic bar feed.

The Rivett No. 918 Plain Cabinet Turret Lathe is an efficient producer of small duplicate parts. The combination of true running work and precise tool indexing creates a place for this turret lathe in fine manufacturing.

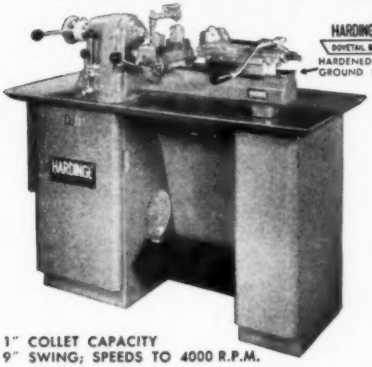
If you have a production problem requiring second operation or initial machining of small finely made parts from stainless steel, brass, plastic or other material, the Rivett 918 guarantees a lower cost solution. Write for Bulletin 918T.

RIVETT LATHE & GRINDER, Inc.

BRIGHTON • BOSTON • MASS. • U. S. A.

The New HARDINGE High Speed Precision Second Operation Machine

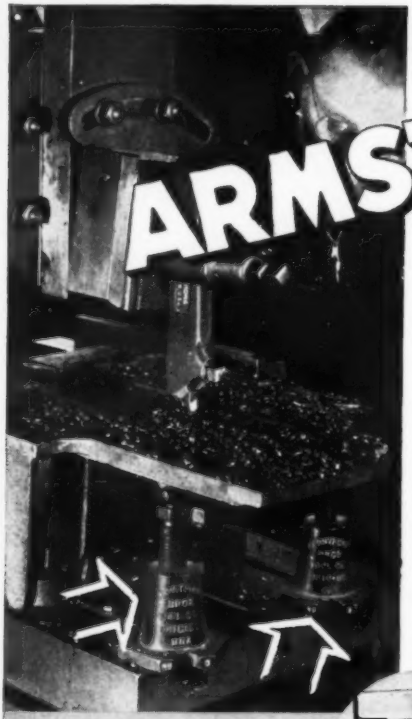
You need this machine for rapid and accurate production of parts requiring secondary operations



1" COLLET CAPACITY
9" SWING; SPEEDS TO 4000 R.P.M.

Above is a typical production run. The machine features hardened and ground steel dovetail ways, Hardinge center-drive preloaded ball bearing spindle, preloaded ball bearing turret head and hardened and ground turret slide ways. Write for bulletin DSM59 regarding additional features.

HARDINGE BROTHERS, INC.
ELMIRA, N. Y.



ARMSTRONG

Setting-Up Tools

Few tool investments pay dividends as consistently as an investment in ARMSTRONG Setting-Up Tools.

These correctly designed, strong and convenient tools cut setting-up time to a minimum. They save machine and man hours day after day and assure rigid set-ups for accurate work, prevent accidents and reduce spoilage.

ARMSTRONG Setting-Up and Hold-Down Tools include types and sizes for every machine tool — "T" Slot Bolts, 6 types of Drop Forged Strap Clamps, Swivel Head Planer Jacks, Non-Skid Vertical and Bracing Jacks.

Write for Setting-Up Tool Circular

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. Francisco Ave. **Chicago 12, U.S.A.**

Eastern Whse. & Sales Office: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. & Sales Office: 1275 Mission St., San Francisco 3, Calif.

Machine Tool Blue Book

Hitchcock Publishing Co., 542 So. Dearborn St., Chicago 5

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MARCH 1946

Featured in This Issue - - - - - - - - - - - - 114

Editor's Page - - - - - - - - - - - - - - 116

Modern Turret Lathes - - - - - - - - - - - 123
By John E. Hyler

Versatility of the Ball - - - - - - - - - - - 139
By H. F. Williams

Frequency in Induction and Dielectric Heating - - - - 172
By Dr. Russell A. Nielson

Screw Products Industry Uses Compressed Air - - - - 209

The Foremanship Forum - - - - - - - - - - 220
By Edmund Mottershead

Drawing Room Kinks - - - - - - - - - - - 234
By H. F. Williams

Your Tax Problems - - - - - - - - - - - - 240
By Arthur Roberts

"Let's Talk Shop" - - - - - - - - - - - - - 254

Determining Four Gear Change Gear Ratios - - - - - 282
By John W. King

What's New in Metal Working - - - - - - - - - 286

New Horizons - - - - - - - - - - - - - - 298
By David T. Armstrong

Mechanics Through the Ages - - - - - - - - - 392

Advertiser's Products Index - - - - - - - - - - 394

Index to Advertisers - - - - - - - - - - 398-402

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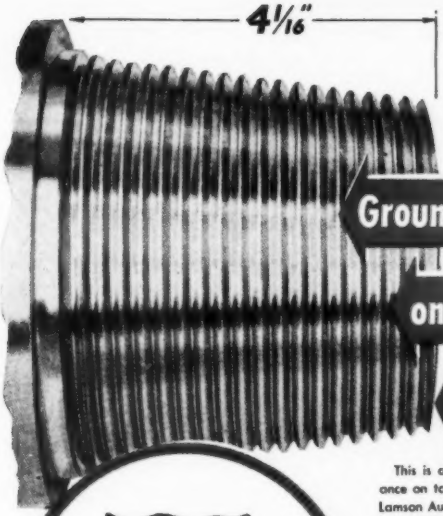
HIGH SPEED PRODUCTION TAPPING at Low Cost

"Buffalo" T-15 TAPPERS

Here's high speed production tapping with economy! Automatic oil supply to tap, easy acting foot feed. Full ball bearing tapper grips spindle rigidly. Adjustable stripper. One-piece oil trough table, many other efficiency features. **Write for Catalog D-37** on your company letterhead.

BUFFALO FORGE CO.
490 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" T-15 TAPPERS



Ground from the solid with one pass of the wheel, in less than 4 min.

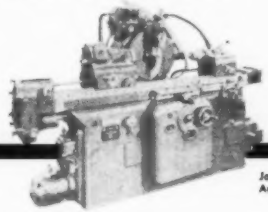
This is a typical example of multi-rib wheel performance on tough, heat-treated steel forgings with Jones & Lamson Automatic Thread Grinders.

The 5-pitch, special form API thread, with a taper of 3 inches per foot, and a mean outside diameter of 4.117", is ground in less than 4 minutes cutting time with a three-rib wheel, one rib roughing, one semi-finishing and the third finishing. More than one pound of metal is removed.

Rapid metal removal, accuracy of form and quality of finish are assured by the FULLY AUTOMATIC WORK CYCLE of Jones & Lamson Automatic Thread Grinders, which includes AUTOMATIC DIAMOND DRESSING OF THE WHEEL, automatic compensation for the amount dressed off the wheel, and automatic sizing.

Why not phone today for one of our engineers to tell you more about production threading with Jones & Lamson Automatic Thread Grinders.

For shorter threads, other multi-rib wheel forms can be used—the full rib type that requires only one complete revolution of the work, and the alternate rib type that requires two complete revolutions. Our engineers can determine the most advantageous method for your needs.



Jones & Lamson Automatic Thread Grinder

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

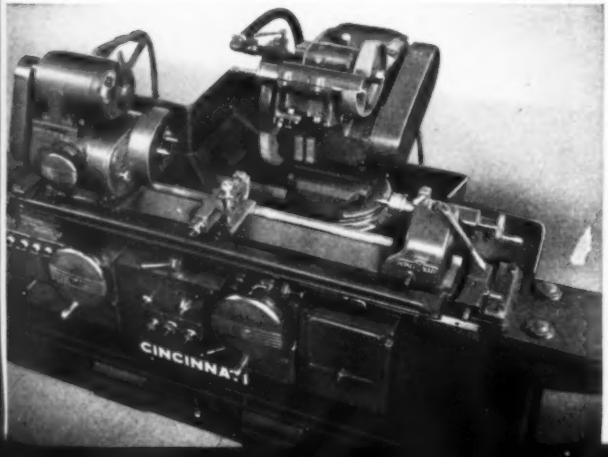
NEW FEATURE

OF CINCINNATI HYDRAULIC UNIVERSALS

Gives you 5 Distinct Advantages

1. Closer accuracy on chuck and face plate work
2. Direct mounting of standard chucks
3. Greater rigidity
4. "Quick Change" adapter for removing work and chuck (or face plate) as a unit
5. Single, accessible adjustment of headstock spindle bearings

These five advantages are obtained through a new headstock spindle design and mounting . . . the front end of the spindle conforms to Lathe Standard Spindle Nose . . . the rear end has a single accessible adjustment for the precision antifriction bearing mounting. This design is now standard on all CINCINNATI Hydraulic Universal Grinding Machines. More details will be sent on request.



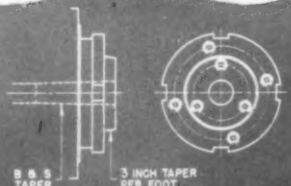
CINCINNATI 12" Hydraulic Universal Grinding Machine. Complete specifications may be obtained by writing for Catalog G-486-3. A brief description of this machine is given in Sweet's Catalog File for Mechanical Industries.

CINCINNATI

CENTER TYPE GRINDING MACHINES

Chuck Mounted in Position

Standard Driver Plate



LATHE STANDARD
SPINDLE NOSE

Sketch shows details of front end of Cincinnati headstock spindle which conforms to Lathe Standard Spindle Nose . . . 5" size for the 12" Hydraulic Universal, and 6" for the 14", 16" and 18" machines.

Quick Change Adapter

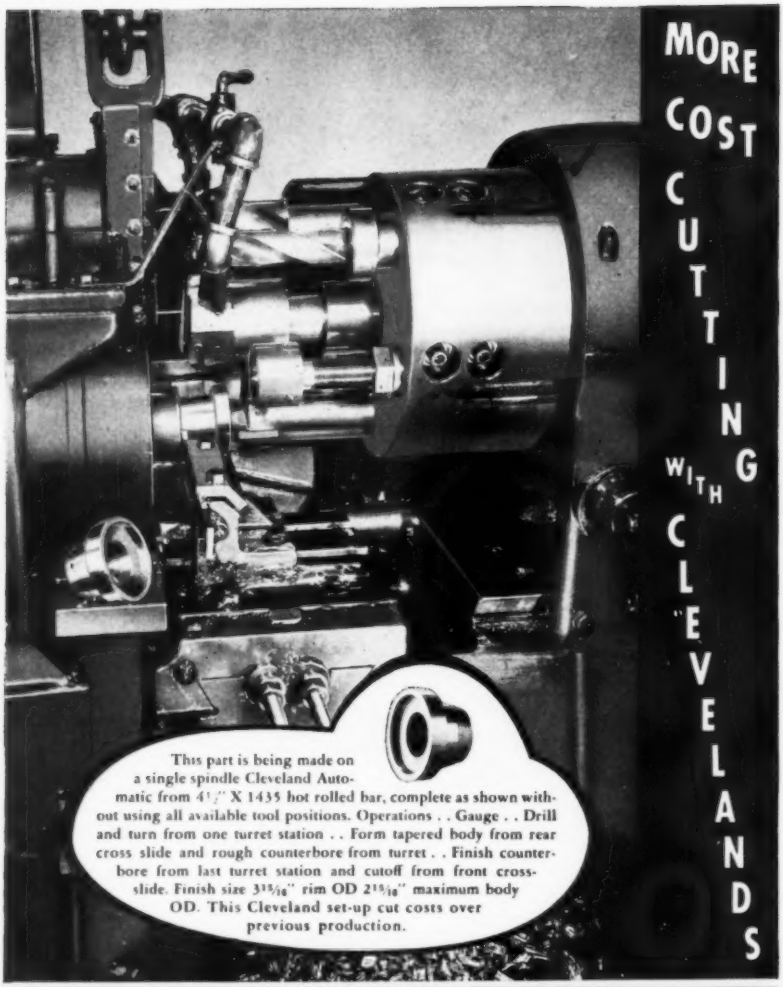
Face Plate Ready
to Mount on Spindle Nose

GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

CINCINNATI


MORE COST CUTTING WITH CLEVELANDS
This part is being made on a single spindle Cleveland Automatic from 4½" X 1435 hot rolled bar, complete as shown without using all available tool positions. Operations . . Gauge . . Drill and turn from one turret station . . Form tapered body from rear cross slide and rough counterbore from turret . . Finish counterbore from last turret station and cutoff from front cross-slide. Finish size 3 15/16" rim OD 2 15/16" maximum body OD. This Cleveland set-up cut costs over previous production.

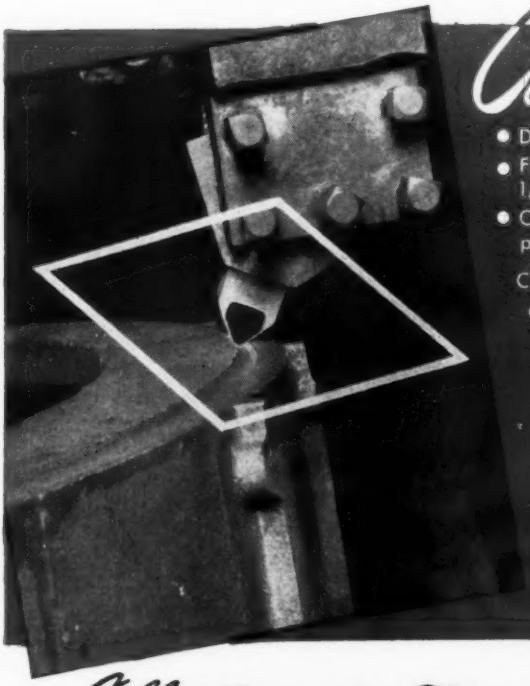
THE CLEVELAND AUTOMATIC MACHINE CO.

2277 Ashland Road · CLEVELAND 3, OHIO

BRANCHES: Chicago · Detroit · New York · Cincinnati · Hartford

FIRTHITE

faced 32 instead of 6 pieces per grind



Conditions:

- Depth of cut . . 3/8"
- Feed per revolution 1/32"
- Cutting speed 235 ft. per minute

Cutting speed was also increased from 100 feet per minute to 235 feet per minute. No wonder the customer said, "A marvelous work value on this job."

If YOU have a cutting problem

Call Firth-Sterling

STEEL COMPANY

OFFICES: McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA
PITTSBURGH • CLEVELAND • DAYTON DETROIT • CHICAGO • LOS ANGELES

SHOPS THAT GET THE BUSINESS

use the

"WHICH OF THESE CONTRACT SHOPS

will we give this job to?" asked the Shop Manager. "Both Brown and Jones seem to have the kind of production equipment to do the work."

"Production equipment, yes" answered the superintendent. "But how about their inspection equipment? How careful are they to keep their mikes and gages true? How do they check threads, tapers, gear tooth forms? Do they follow modern accurate inspection methods, or are they the kind of folks who depend on one little old set of gage blocks, pretty well worn, that they keep in the office safe and permit its use only once in a dog's age? They talk only about their production facilities, so I'm doubtful.

"Now take the Robinson people—a moderate sized shop, but these half-thousandth limits on our blueprints wouldn't worry them. They pride themselves on their complete inspection setup. I know they have a toolmaker's microscope, a projector for checking magnified images of threads and other forms, a set of good blocks that they use constantly, optical flats to check them for wear, and to check contact surfaces of mikes and gages. They have a binocular microscope too, and other equipment that all adds up to the fact that they talk our language on accuracy. They call their setup a **SCHERR 'LIMITED BUDGET' INSPECTION LABORATORY,** and Robinson told me it didn't cost too much and has saved its cost many times over."

The Manager thought a moment, then said, "Tell Robinson to come over."

• • •

Moral: Sell your shop not only on the basis of its **production** capacity, but also on its **inspection** facilities. Your strongest sales aid is a SCHERR LIMITED BUDGET INSPECTION LABORATORY.

THE SCHERR *Limited Budget*
INSPECTION LABORATORY

1.—SPENCER BINOCULAR MICROSCOPE gives three-dimensional vision—the sure way to inspect surfaces finish, scratches, imperfections, etc., indescribable to detect with single vision viewer. Price, $180.50.

2.—ULTRA CHEK GAGE BLOCKS accurate within .000008". A sound basis for building the accuracy standards of the entire shop. Large and small sets. In most all grds of the entire shop. Large and small sets. In most all requirements. 34-block set, with optical flat, $125.00.

3.—SCHERR MAGNI-RAY magnifies work under inspection and floodlights it with rays shielded from operator. Three models priced at $18.50, $27.50 and $35.50.

4.—SCHERR COMPARITOL gives visual, magnified readings to 1/10,000". Checks gage blocks, plugs, other tools for wear. Rapidly checks volume production of small parts without dependence on skill or "feel" of operator. $195.00.

5.—THE WILDER PROJECTOR throws a magnified image of the part on a master drawing instantly showing any deviation from accuracy. Used for positive check on all forms—tools, templets, gages, threads, gears. Magnifications from 10x to 100x. $268.75.

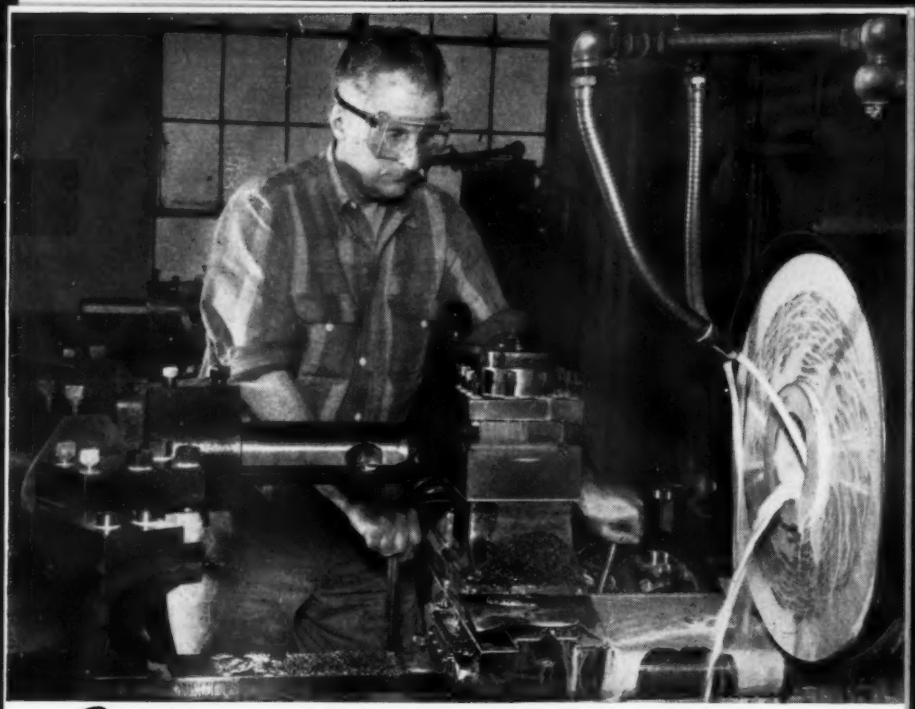
6.—BAUSCHER TOOLMAKERS' MICROSCOPE immensely simplifies visual inspection of small part profiles in magnified projection, permitting direct measurement in fine dimensions and angular measurement by optical protractor.

7.—OPTICAL PARALLELS using the method of light wave interference to check flatness and parallelism on measuring surfaces. Single parallels, $10.00. Set of 2, approx. .0125" apart for micrometer inspection, $25.00.

* * *

With these super-accurate inspection tools, any shop can have accuracy standards up to those of the largest plants in the country. You will be interested in full details on any or all of this equipment. Write us.

GEO. SCHERR CO., Inc. 198 LAFAYETTE STREET NEW YORK 12, N. Y.



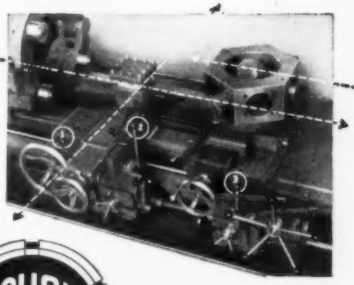
SPEED UP THE MACHINING CYCLE

WITH 3-WAY POWER RAPID TRAVERSE . . .

THERE is less time lag between cutting operations with a Gisholt Turret Lathe—thanks to this outstanding feature.

Gisholt provides power rapid traverse in all 3 ways—for longitudinal travel of *both* the square and hexagon turret, as well as for the in-and-out movement of the cross slide. Traverses may be operated simultaneously or independently in either direction. Tools move more quickly in and out of cutting position—save time and operating effort to speed up production.

This 3-way combination of power rapid traverses, standard on all Gisholt Saddle Type Turret Lathes, is another exclusive Gisholt feature that makes for swifter, lower-cost production and wins favor among operators wherever it is used.



The photo above shows operating controls for: 1. Longitudinal traverse of the square turret; 2. Cross traverse of cross slide; 3. Longitudinal traverse of the hexagon turret.

Gisholt's complete power rapid traverse is only one of many advanced features which speed up production and cut costs.

GISHOLT MACHINE COMPANY

1185 East Washington Ave. • Madison 3, Wisconsin

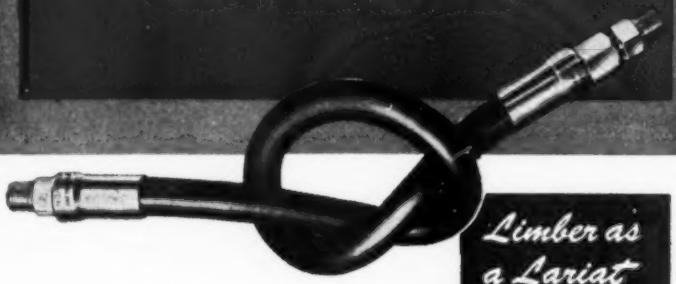
Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

Norgren

SYNTHETIC HOSE ASSEMBLIES ARE DEPENDABLE



Limber as a Lariat
STRONG as STEEL

Built for use anywhere. Constructed of finest quality, oil resistant synthetic tube and cover, reinforced with two layers of high tensile steel wire, uniformly braided — assuring flexibility even under high working pressures.

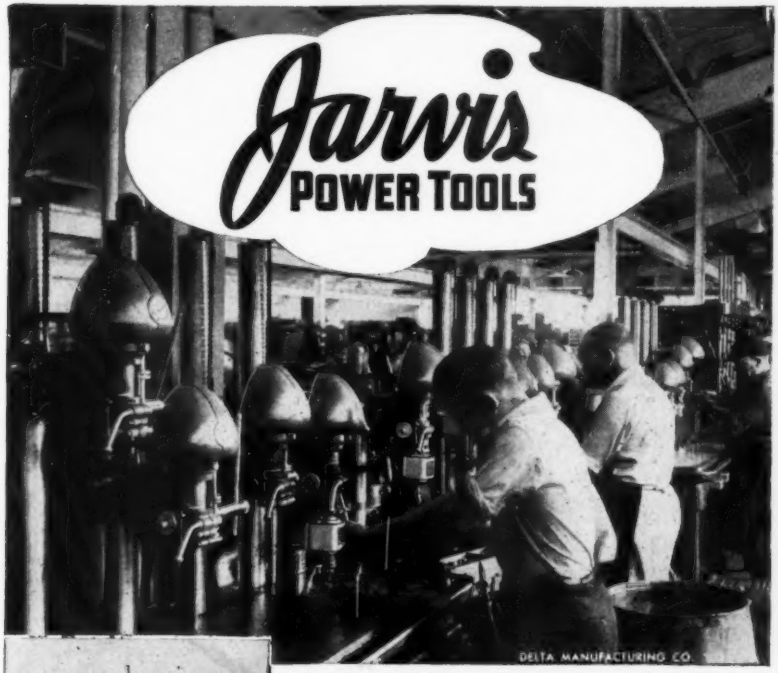
Resistant to solvent and vibration, heat and cold. Recommended for working temperatures of —40°F. to 250°F. Permanent machined couplings for high pressure, reusable couplings for low pressures.

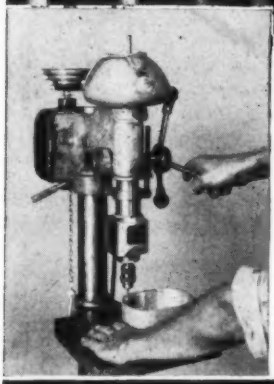
Meet every requirement for pneumatic or hydraulic installation. Available in hose sizes of ¼" to 1"—any length.

Write for new bulletin No. 250. C. A. Norgren Company, 220 Santa Fe Drive, Denver 9, Colo.

Norgren

Jarvis POWER TOOLS





JARVIS TAPPING ATTACHMENTS

drilling . . . countersinking . . . and TAPPING

In a continuous flow. No waste motion. No additional handling of parts. Jarvis Tappers — THE STANDARD on your multiple spindle drill presses. Capacities from No. 2-56 to 2".

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

Tool Up for Better

TO SPEED AND IMPROVE

ENGINEERED TO THE SEEING NEED OF EACH WORKER'S TASK

LOCALITE fostoria

for Light ON the Job

FOSTORIA LOCALITES DIRECT LIGHT EXACTLY WHERE NEEDED

Instantly adjustable to any position, the flexible jointed Localite enables workers to control proper visibility of their task. Arm joints are vibration-proof, friction-tight ball and socket design. Various type reflectors for incandescent and fluorescent lamps are available to give the intensity and coverage of illumination desired for each particular "seeing" requirement.

Seeing

MACHINING — ASSEMBLY — INSPECTION

MODEL 3267-H-174-SV
for Small Machine Work-Areas
LATHES, GRINDERS, DRILL PRESSES, ETC.
IN EXCESS OF 175 FOOTCANDLES
MODEL 34-A-173-SV
for Small Area Machine Operations where extra good shielding is required.
IN EXCESS OF 100 FOOTCANDLES
MODEL 3267-U-172
for Certain Precision Machining and Small Part Assembly and Inspection.
IN EXCESS OF 250 FOOTCANDLES
MODEL 3267-C-172-SV
for Large Machine Work-Areas
MILLERS, BROACHERS, STAMPING PRESSES, ETC.
IN EXCESS OF 150 FOOTCANDLES

Write for Complete Catalog of All Models

Your lighting problems in the hands of Fostoria specialists will receive expert analysis and recommendation. Write for the complete catalog of Fostoria Lighting Equipment with detail information on critical work-area illumination.

THE FOSTORIA PRESSED STEEL CORP.

FOSTORIA, OHIO In Canada - Amalgamated Elec. Corp., Ltd., Toronto
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CAN YOU *Equal* THIS DRILLING SPEED?

7200
¼" Diameter
HOLES
One at a Time
In ¼" Steel
Per
10-Hour Shift

Govro-Nelson Automatic Drilling Units are continually making new speed records. For example, in the illustration here shown, the operator, with a single drilling unit, is drilling ¼" holes in ¼" thick 24 ST aluminum, one at a time at the rate of 720 per hour — one every 5 seconds — 7200 during the course of a 10-hour shift.

Designed for drilling up to ⅜", depending upon the material. Send blueprint or part for our recommendation as to your particular drilling problem. No obligation.

WRITE FOR Literature

GOVRO-NELSON CO.
1933 Antoinette
Detroit 8, Mich.

Automatic **DRILLING UNIT**

Right
ON THE DOT
THREADWELL
GREENFIELD
Color -ification is an exclusive feature of Thread- COLD-TEMPER Taps — red dot for high sp- cut thread, white dot for commercial ground- fine dot for precision ground.
Other things being equal, color i-dot-ification is a convenience feature that makes it worth while to specify Threadwell. But other things are not equal. Threadwell COLD-TEMPER Taps give you cleaner, more uniform, more accurate threads and more of them per tap. All we ask is that you try them and find out for yourself. Your local Threadwell distributor is prepared to provide personal attention to your tap needs.
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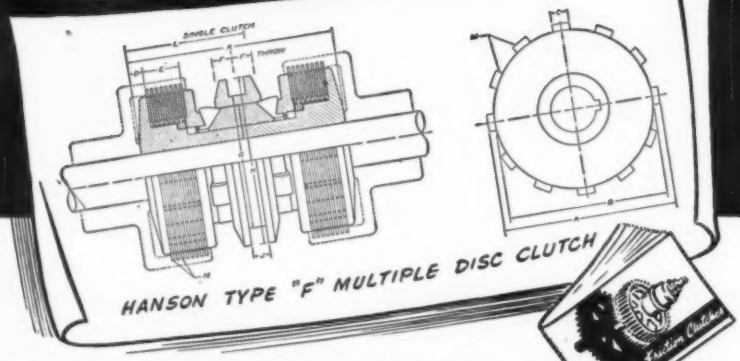
CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21

A *HANSON* TRIUMPH...
THE MULTIPLE DISC FRICTION
CLUTCH



HANSON Engineers Are Ready To Help You . . .

If you have a clutch problem, in the Hanson line you will find just the clutch to take care of it, and our engineers are ready and willing to help you.

The multiple disc type "F" clutches were designed primarily to meet the demands for high quality, compact clutches of great horse power capacities for the available installation space.

Hanson clutches are fully covered by patents and operate at high speeds without any effect from centrifugal force due to perfect balance.

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Catalog FREE on Request

The Hanson Clutch and Machinery Co.
BOX H-44 **TIFFIN, OHIO**

HANSON *Friction Clutches*

for every clutch requirement, regardless of load or drive speed.

HANSON QUALITY HCDM

SIMONDS gives you the right Band Saw to deliver Top Output and Economy in cutting any type of Metal or Plastic

1. REGULAR HARD EDGE BAND SAWS

Simonds Steel Mills produce a special tough alloy steel for these saws. Teeth are sharp, perfectly milled, and set even on both sides of blade, to give clean, easy cutting and long saw life. And joints are welded for equal strength with rest of blade.

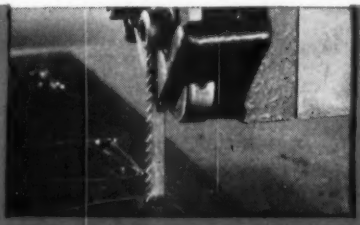
2. SKIP-TOOTH BAND SAWS

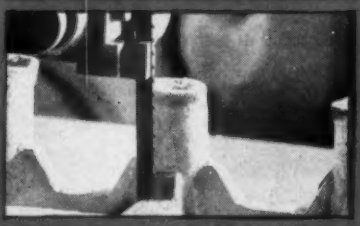
Have the extra gullet-capacity for large chips from aluminum, magnesium, plastics and wood. These saws stay sharp so long that it's economical to replace them and save resharpening. They have the same hardened tooth-edge as the Regular Hard Edge Saws. Made in widths from ½" to 1". Tooth-spacings: 2, 3, 4, and 6 per inch.

3. SPRING TEMPER BAND SAWS

Especially recommended for cutting thin sheet aluminum, magnesium, and steel . . . also brass, light structural shapes, plastics, fibre, non-ferrous tubing and similar materials. These blades cut for exceptionally long periods without dulled teeth . . . and then they are quickly reset and filed and put back on the machine.

Consult your Industrial Supply Distributor about the best type and specification of Simonds Band Saw for your work. Or write the nearest Simonds office.





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SAW AND STEEL CO.
FITCHBURG, MASS.

Branch Offices:
1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 511 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash.; *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

ROGERS "Perfect 36" VERTICAL TURRET MILLS

Are Occasionally Built with Modifications to do Special Jobs

From time to time, special "off standard" mills for special operations come off the same production line as standard Rogers Mills. All backed by 61 years of engineering developments. Simplicity of design assures LOW INITIAL COST . . . LOW OPERATING COSTS . . . LOW PRODUCTION COSTS. Ask Rogers how to solve your particular problem by writing TODAY.

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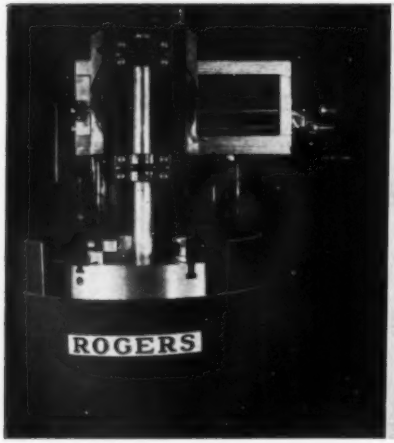
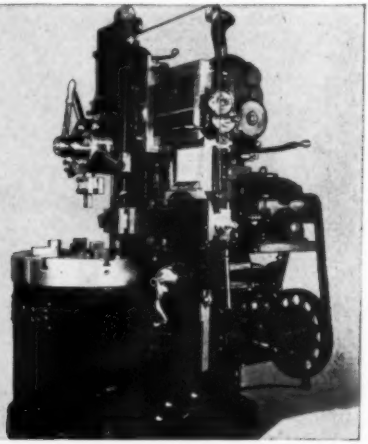
Showing the special Rogers Mill built to perform an unusually difficult boring operation. The extra heavy bar arrangement and 3-jaw combination chuck are for single operation work not requiring a turret.



A slight modification was made on this Rogers Mill by raising the rail to permit the turning of higher castings.



MORE ACCURACY AND FASTER TAPPING

This head will help you increase production. It cuts class three threads, or better, on long production runs. Consider these exclusive features:

1. One head for rotating or stationary spindle machines—just remove handle and apply cover plate. Cuts down tool investment.

2. Simple construction—few parts—broad bearing surfaces—hardened and ground throughout—for longer life.

3. Blade-type ground thread chasers on sizes 1¼″ to 4″—circular ground thread chasers on sizes 3″ to 5″.

4. Quick trigger-action collapsing—easy diametric adjustment without removing head from holder.

Quicker—more productive—easier to operate—higher precision—smaller tool investment—longer life—Catalog D42 C.

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Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

Standardized!

NEW efficiency . . . new economy . . . new savings in the cost of power application. CONWAY CLUTCHES are precision built in STANDARD MODELS which are engineered to fulfill practically any purpose in transmitting power where needed.

ALL PARTS INTERCHANGEABLE

CONWAY CLUTCHES

Embodying every feature which makes for good practice in your plant . . .
instant stopping and starting,
drag-free idling,
large lever ratio,
ease of engagement,
centripetal action,
no exposed parts . . . and
numerous other outstanding factors of excellence.

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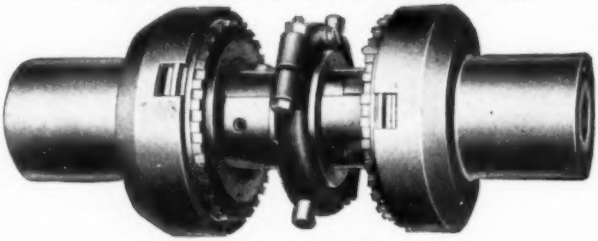
ILLUSTRATED: CONWAY DOUBLE-THROW CLUTCH



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THE CONWAY CLUTCH CO.

1541 Queen City Ave. Cincinnati 14, Ohio

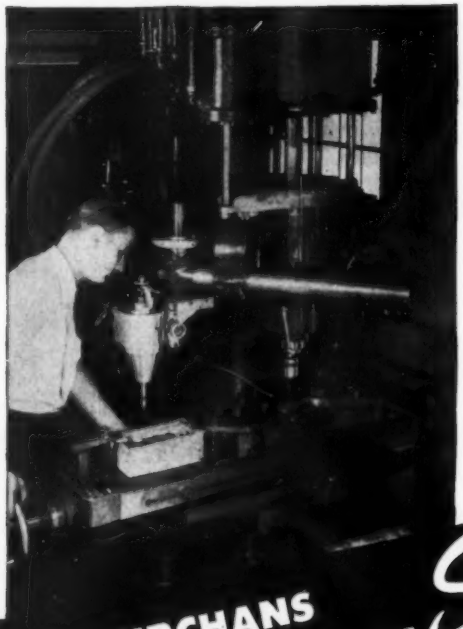
Saw More
METAL CUTTING MACHINES

GUARANTEES THESE OUTSTANDING FEATURES

★ Self-alignment of the blade is guaranteed by the exclusive Sawmore mounting of the four bearing shoes in the bearings of the saw frame.
★ The vertical saw frame slide permits straight line drive, regardless of frame position, and greater accuracy in cutting.
★ Stock is fed automatically up to the full capacity of the machine by a 12 foot stock carrier.
★ Spacer bar and scale accurately determine length of pieces to be cut. The spacer bar may be set for individual or multiple lengths.
★ Sawmore machines are particularly adapted to cold cutting of bars and shapes.
★ The machine swivels on the base up to 45 degrees which makes possible both straight and angular cutting without moving or swinging stock.

Machine Size	10"x10"	6"x6"
Capacity-Straight Cutting	10"x10"	6"x6"
Capacity-45° Angle Cutting	10"x10"	6"x4"
Blade Stroke	6"	6"
Blade Length	14"x18"	14"
Speeds	65, 93, 120, 149 S.P.M.	65, 93, 120, 149 S.P.M
Height of Table	22"	22"
Height Over All	66"	56"
Floor Space	5'8"x3'	5'2"x3'
Size and Speed of Motor	2 H.P. 1750 r.p.m.	2 H.P. 1750 r.p.m.
Net Weight	1830 Lbs.	1670 Lbs.
Shipping Weight	2010 Lbs.	1865 Lbs.

MAQUOKETA COMPANY . . . MAQUOKETA, IOWA



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SEE TURCHANS IN OPERATION AT THE *Show!*

Booth 1218 (Arcade)

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Here you will see Duplicating at its best—unusual duplicating jobs such as can only be done by a duplicating machine that is hydraulically controlled.

You'll be amazed at the simple Turchan set-ups that will enable your lathes, milling machines and other machine tools to perform jobs that formerly required expensive special machines—set-ups that give your machines greatly increased versatility without interfering at all with the use for which the machines were originally designed.

TURCHAN

TURCHAN FOLLOWER MACHINE CO.
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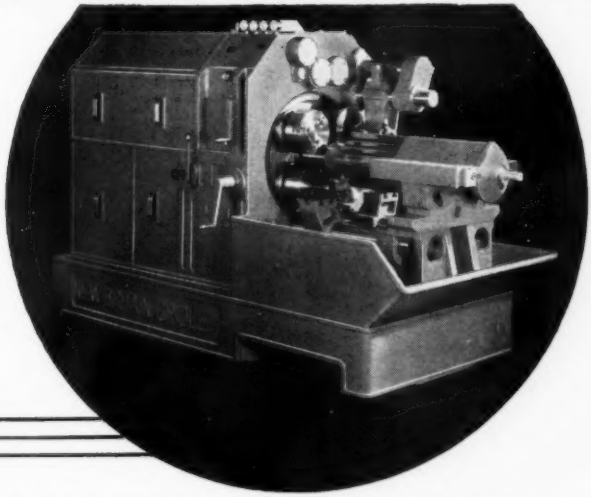
Hydraulic Follower Machine

WIDE OPEN SPACES MEAN QUICK, EASY TOOLING ·



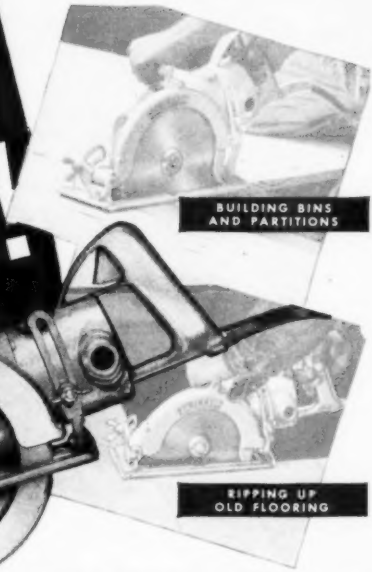
There are many reasons why New Britain stands first in multiple spindle automatic chucking machines . . . but none is more important than its wide open accessibility through *open end construction* to all tools and chucks, and convenient chip removal. More pieces per hour because no time is wasted reaching for hard-to-get-at points.

New Britain builds a complete line of Multiple Spindle Automatic Chucking Machines . . . four, six and eight spindles up to 12" capacity. Also a complete line of Multiple Spindle Automatic Screw Machines to 2¼" capacity.

NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
NEW BRITAIN-GRIDLEY MACHINE DIVISION

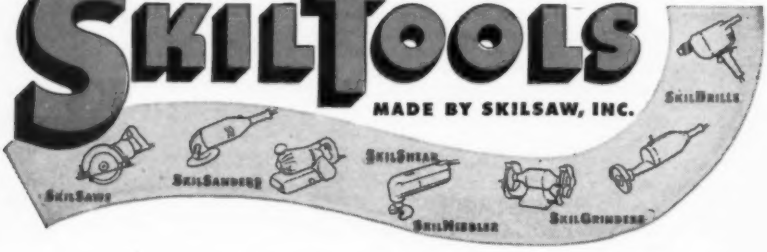
you've got
9 EXTRA HELPERS
when you remodel with
SKILSAW!



● ONE MAN with a SKILSAW can do the work of 10 MEN with handsaws . . . in 1/10 the space . . . with 1/10 the material handling . . . at 1/10 the labor cost. SKILSAW saves time and money in so many ways that you can't afford to be without it . . . whether you're making alterations in your plant, uncrating machinery, building pallets or just doing frequent odd sawing jobs. Ask your distributor today for a demonstration.

SKILSAW, INC., 5033-43 Elston Ave., Chicago 30, Ill.
Factory Branches in All Principal Cities

PORTABLE ELECTRIC
SKILTOOLS
MADE BY SKILSAW, INC.



THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

Shaping a 10,000 lb. Plate

The Shaper is recognized as indispensable in the toolroom—but many manufacturing jobs are best performed on Shapers. Whether shaping slots in a 10,000-lb. plate or contouring small parts, the power and accuracy of Cincinnati Shapers will meet your requirements.

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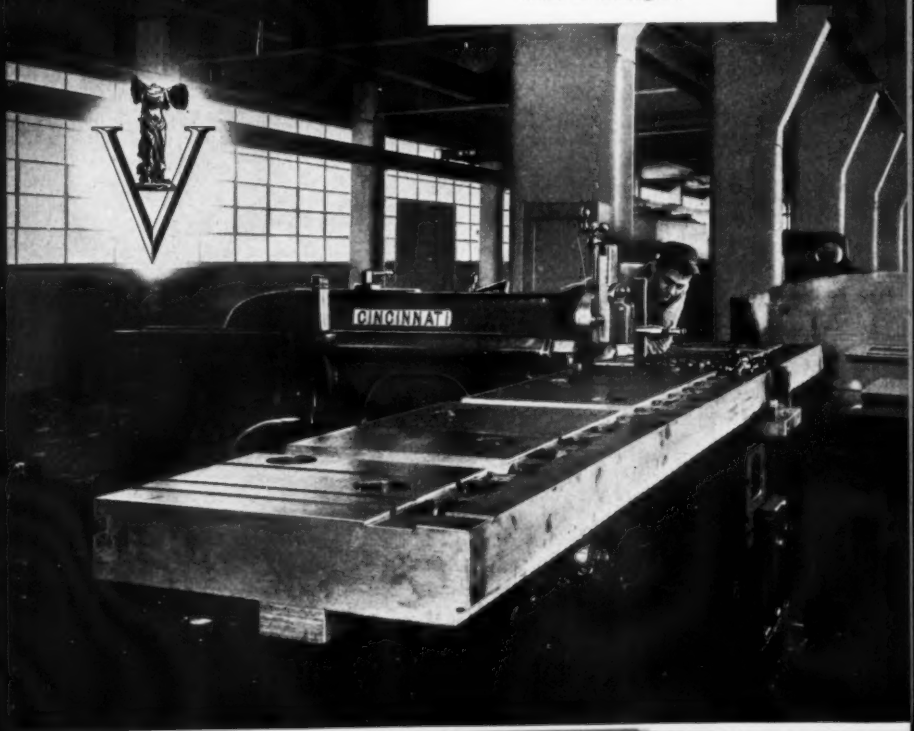


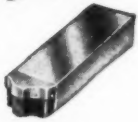
PEACETIME PRODUCTION
MEANS BACK TO COMPETITION!

and here are the tools that will give you the "edge" on

COMPETITION!

● Yes, peacetime production will have its problems, even as war production. Not the *same* problems, but just as tough. Competition will require tools that cut clean—fast—smooth—accurately.

You can depend upon MEYERS GENERATED CARBIDE-TIPPED FORM TOOLS to give you the "edge" on competition, by giving you more pieces per hour—more pieces between grinds—and a much smoother finish. On actual production runs, MEYERS GENERATED CARBIDE-TIPPED TOOLS have boosted production by more than 500%!



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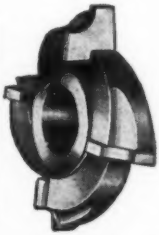
MEYERS GENERATED

Carbide-Tipped

FORM TOOLS



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Established 1888

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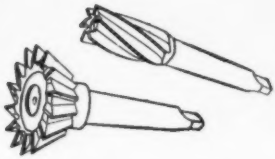
FOR PRODUCTION



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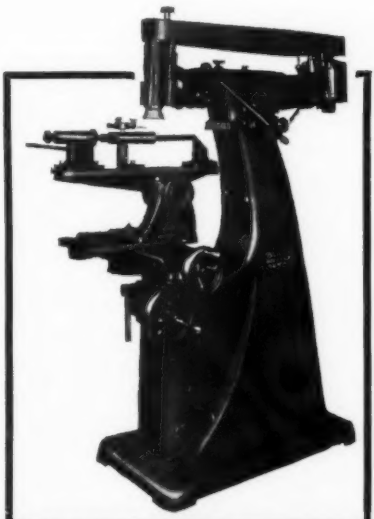
Difficult Cutters are ground easily on the ACE Cutter Grinder . . . Easy to operate the ACE keeps the work before the eyes of the operator . . . no bending . . . no squatting . . . no squinting . . . Eliminates work fatigue.

We recommend it for grinding face mills up to 15", slitting saws, end mills, angular cutters, slab mills, dovetail cutters, reamers, taper reamers, gear cutters, double angle cutters. Fellows helical cutters, production gashing, radial relief grinding, radius work, and newer uses found every day.



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Don't Neglect Your Toolroom It's the Backbone of Production!

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BERKELEY DRIVES

Cut Production Costs

Everybody is interested these days in raising production and cutting costs. It involves the use of modern tooling—generally carbides—and operating your machine tools at higher speeds. That's where BERKELEY can give you real help for he knows what you need.

BERKELEY gives you individual motorizing units that are designed specifically for your machine tools—sturdy, long-lasting drives that are easy to install—that require minimum maintenance and soon repay their original cost through production economies which they make possible.

BERKELEY can supply drives for practically all types and sizes of machine tools, engineered exactly for your requirements.

It will pay you to put your drive problems up to BERKELEY—and there are no obligations.

BERKELEY EQUIPMENT COMPANY

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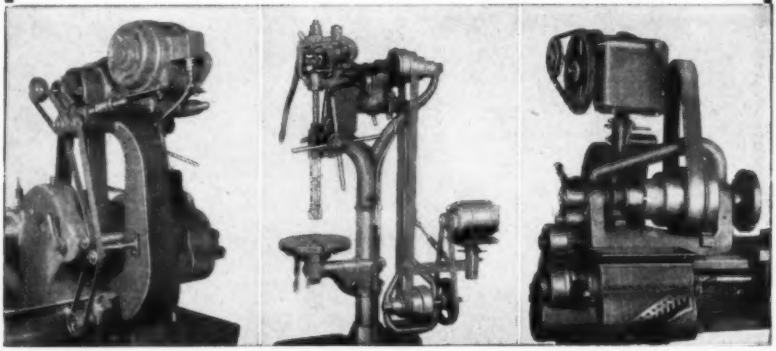
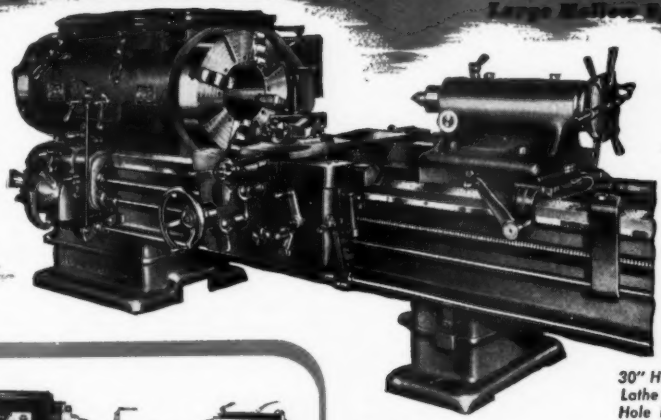


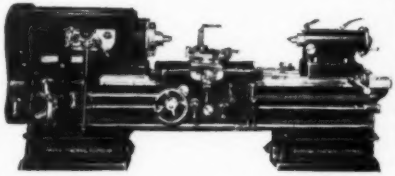
Do it Better!... on a

HYDRATROL LATHE

Large Hollow Spindle Type



30" Heavy Duty Lathe with 13" Hole in Spindle



Standard Type, Heavy Duty HYDRATROL LATHES, 20" to 36"

The big 27" size, shown above, has all the ruggedness and power for the heaviest possible work. And its many refinements in design and construction result in an ease of operation comparable to small machines.

In hundreds of plants—under all sorts of conditions—LEHMANN HYDRATROL LATHES have invariably brought about faster production, better work, lower costs.

Look around your own shop—you may find a number of machining jobs which possibly could be done better on a Large Hollow Spindle Type of HYDRATROL LATHE. Send us prints of these unusual, difficult, or too-costly machining jobs, for a specific, time-and-money-saving recommendation.

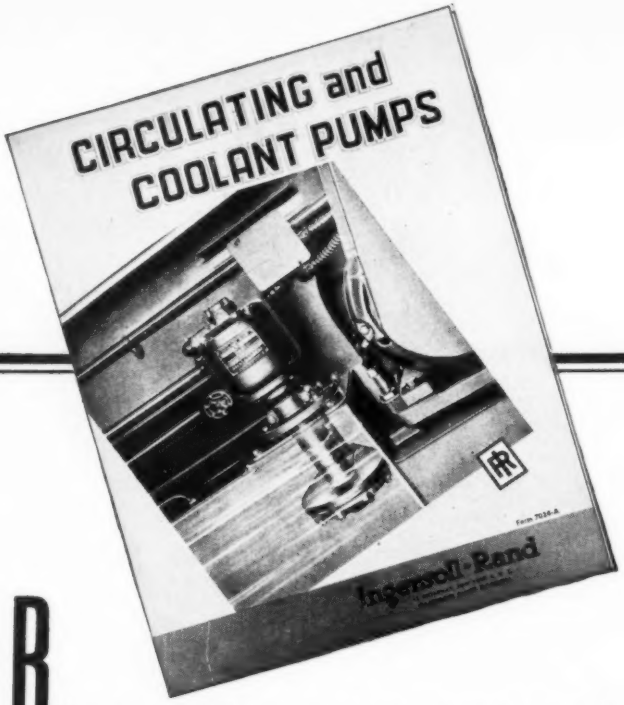
Five Sizes - 18" to 36"

Small	18" up to 7 1/4" Hole
Medium	24" up to 12" Hole
Large	27" up to 13" Hole
Large	30" up to 14" Hole
Large	36" up to 16 1/2" Hole

(Standard type lathes, 16" to 36")

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND . . . ST. LOUIS 3, MISSOURI



Before you install a new machine tool or before you replace the pump on your existing machine, investigate the Ingersoll-Rand line of circulating and coolant pumps. These units have been developed especially for handling coolant and cutting fluid on machine tools.

Form 7024-A, illustrated above, is filled with pertinent information including dimensions and performance on these pumps. Write for your copy today.

Ingersoll-Rand

11 Broadway, New York 4, N. Y. 9-798

The CONE AUTOMATIC MACHINE COMPANY sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

The National Advisory Committee for Aeronautics proposes to release to schools, libraries and industries over 300 technical reports hitherto secret.

get ready with CONE for tomorrow

Lycoming is experimenting with two new aircraft engines: a 36-cylinder, 5,500 lb. radial developing 5,000 h.p., and a 12-cylinder, 2,100 h.p., weighing only 1,445 lbs.

get ready with CONE for tomorrow

Monsanto Chemical Co. has a plastic armor plate that has shattered machine gun bullets in tests.

get ready with CONE for tomorrow

Curtiss-Wright is working on an "uninhabited" airplane capable of 1,400 miles per hour.

get ready with CONE for tomorrow

Firestone is making a heavy-duty tire with a wire carcass for off-the-road trucking.

get ready with CONE for tomorrow

A new distillery, the largest of its kind in the Western Hemisphere, will be built in Maine to make alcohol from Aroostook County potatoes.

get ready with CONE for tomorrow

Shell Oil Company has a new combustion head for gun-type domestic burners that will cut fuel consumption 20% and is suitable for use on burners now in operation.

get ready with CONE for tomorrow

Eastman Kodak promises that any reasonably well equipped amateur will soon be able to make his own color transparencies and prints.

get ready with CONE for tomorrow

Jack and Heintz will manufacture the Skinner gasoline engine. This is a double-opposed "pancake" type, made largely of aluminum with a compression ratio of 8 to 1 and a weight of less than 2 lbs. per h.p.

Mellon Institute has found, after thorough testing, that solid magnesium alloys do not burn.

get ready with CONE for tomorrow

The Weather Bureau has begun a survey of the country's wind resources in anticipation of the use of wind power for generating electricity.

get ready with CONE for tomorrow

A new kind of glass made by American Optical Company transmits 90% of visible light rays, but only 10% of heat rays.

get ready with CONE for tomorrow

Fifteen years of research have led to a form of porcelain enamel, made by C. Hommel Co. of Pittsburgh, that is so thin as to be practically chipless.

National Carbon Company has a new oil made with a secret non-petroleum base, called "Prestone Motor Oil" that shows very little change in viscosity from 30° below zero to operating temperature.

get ready with CONE for tomorrow

Illinois Central and Edison General Appliance Co. have collaborated on the first all-electric dining car, scheduled to go into service early in 1946. The car has its own diesel generating plant which supplies all facilities for cooking, freezing, dish washing, garbage disposal and air conditioning.

get ready with CONE for tomorrow

The Celotex Corporation has patented a process for making building planks out of excelsior and Portland cement.

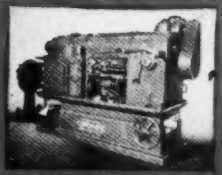
get ready with CONE for tomorrow

Another substitute for natural paint brush bristle is made of casein and was developed by the Eastern Regional Laboratory of the U. S. Department of Agriculture.

3 of these diameters are eccentric

This washing machine part, made of B-1112, is machined from round stock on a 1¼" 8-Spindle Conomatic in 10 seconds. Three of its five diameters are eccentric to .010".

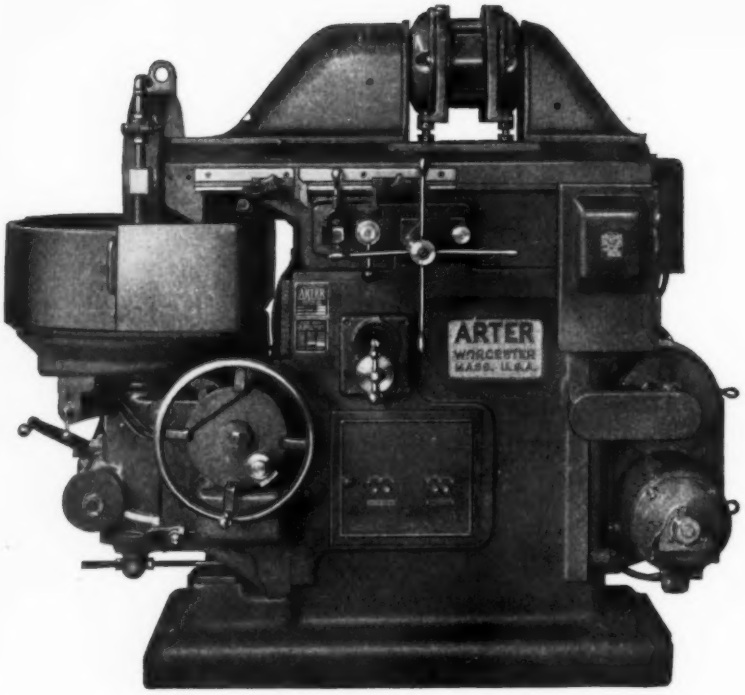
Write the Cone for particulars.



Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.



Now in Production - ARTER Model D 12" and 16" Rotary Surface Grinders

Improvements and refinements that insure work being ground to extreme precision and high finish are outstanding features of this grinder, held back by war restrictions, but now available. ARTER engineers will be glad to analyze your products and point out to you how this grinder can meet the most exacting requirements of your own surface grinding.

ARTER GRINDING MACHINE CO.
WORCESTER, MASSACHUSETTS • U. S. A.

There are Six

HIDDEN HANDS

in this Picture

Thor

PNEUMATIC ASSEMBLY TOOLS

Drive Screws, Set Nuts, Three Times Faster Than Hand Tools

The *picture* shows this girl's two hands operating a Thor 217 Pneumatic Screwdriver.

But, if you could *watch the job* you would see in the speed with which this girl completes assemblies a ratio of "six hidden hands" inside that Thor tool which help her assemble *faster . . . surer* than any three operators using hand tools.

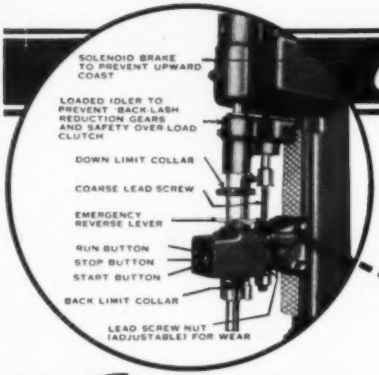
NO HUMAN HAND can approach the unfailing accuracy, precision and speed with which Thor pneumatic assembly tools drive screws and nuts. On most models, an *adjustable* clutch controls precisely the tightening of the fastener to the exact tension required. Write or call your nearest Thor branch today.

INDEPENDENT PNEUMATIC TOOL CO.
600 W. Jackson Blvd., Chicago 6, Illinois

BIRMINGHAM BOSTON BUFFALO CLEVELAND DETROIT LOS ANGELES
MILWAUKEE NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS
SALT LAKE CITY SAN FRANCISCO TORONTO, CANADA LONDON, ENGLAND

Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS


SOLENOID BRAKE TO PREVENT UPWARD COAST
LOADED IDLER TO PREVENT BACK LASH REDUCTION GEARS AND SAFETY OVER LOAD CLUTCH
DOWN LIMIT COLLAR
COARSE LEAD SCREW
EMERGENCY REVERSE LEVER
RUN BUTTON
STOP BUTTON
START BUTTON
BACK LIMIT COLLAR
LEAD SCREW NUT (ADJUSTABLE) FOR WEAR

Avey FEATURE No. 3

THE Avey TYPE MA-6
AVEY-MATIC POWER FEED HAND FEED AND REVERSING MOTOR TAPPING MACHINE

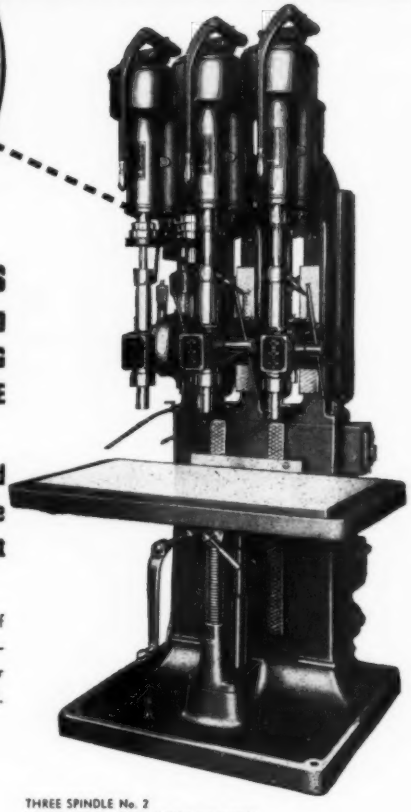
features

reversing motor, positive lead screw tapping — for accurate thread and tapping in soft material or thin sheets

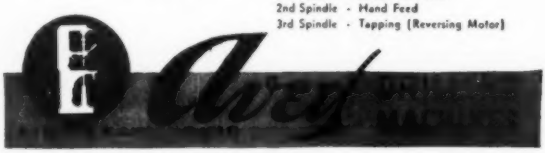
Dog control for depth — maintaining accuracy of depth within one-half revolution of the spindle — or emergency relief lever used to reverse motor if necessary before tapping cycle is completed.

Type MA-6 is made in following capacities:
No. 2 — 7/8" capacity in cast iron.
No. 3 — 1 1/4" capacity in cast iron.

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.



THREE SPINDLE No. 2
TYPE MA-6 • COMBINATION MACHINE
1st Spindle - Avey-matic Feed
2nd Spindle - Hand Feed
3rd Spindle - Tapping (Reversing Motor)



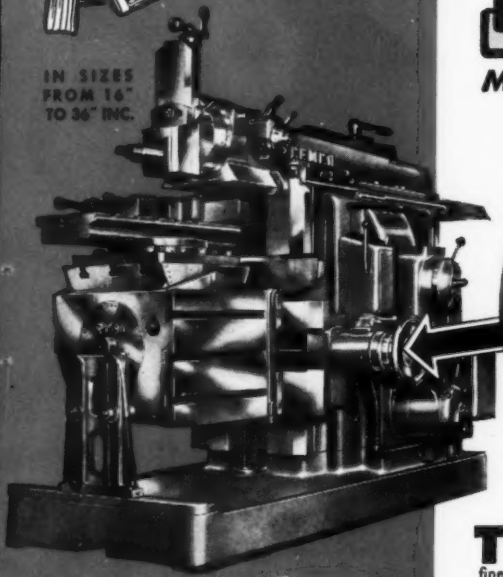
NEW Safety Hand Wheel!

ANOTHER "FIRST" FOR

GEMCO

Multi-Purpose SHAPERS

IN SIZES FROM 16" TO 36" INC.



10" Plastic Safety Hand Wheel—Now Standard Equipment On All GEMCO Shapers

✓ *Check These Features*

The Universal Type of GEMCO Shaper, shown above, is ideal for tool and die work, or where angular work set-ups are required. Time-tested features: Exclusive "Lubrigard" Safety Device increases the precision life—Centralized Controls save time and effort, increase production—Large, easy-to-read dials—Wide range of feeds and speeds.

Write Today for Bulletin GC-12B

THIS practical, protective Safety Hand Wheel is the answer to users' requests for a hand wheel to facilitate fine adjustment of the table on the cross rail. These adjustments are not readily performed, with the conventional crank, when the operator's attention is focused on the work piece. The Hand Wheel surface is always in position for convenient manipulation under these circumstances.

The new GEMCO Safety Hand Wheel supplements the conventional crank, which can still be used for rapid manual table positioning.

When the GEMCO Shaper is equipped with rapid traverse, the hand wheel, upon engagement of this unit, rotates with the feed screw, the crank remaining stationary.

Let your next Shaper be a GEMCO, with this new Safety Hand Wheel.

GENERAL ENGINEERING & MFG. CO.

SAINT LOUIS 4, MISSOURI

Manufacturers of PRECISION MACHINERY Since 1917

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE!

America's war plants are switching to new, powerful Speedy Air Vises! From a single vise . . . to an installation of fifty . . . they are saving time, effort and labor costs! Air operated, *foot controlled*—both hands are left free for more rapid drilling, tapping, light milling, assembly, etc. Complete with Foot Control Valve, Air Hose and Fittings, only **$24**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

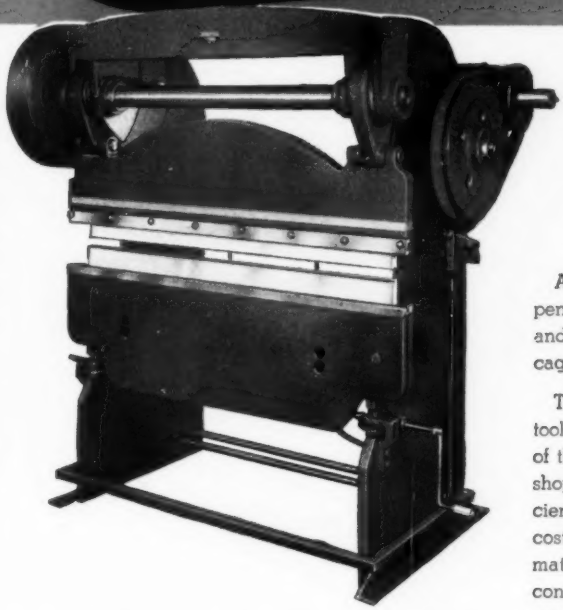
AIR REGULATOR
Precision-built. Delivers pressures up to 140 lbs. With gauge, $4. Less gauge, $2.50

AIR FILTER
Keeps water and particles out of the regulator and pneumatic tools. $1.50

BLOW-GUN
Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . . $2.50

W. R. BROWN CORP., 5724 ARMITAGE AVE., CHICAGO 39, ILL.

Powerful CHICAGO STEEL PRESS BRAKE



NEW TYPE "300"

A POWERFUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

This money-saving production tool will handle 40 to 50 percent of the work done in an average shop. Greater speed, higher efficiency—much lower operating cost—plus the highest quality material and sturdy welded construction as in our larger machines.

—3 sizes—capacities 10 gage, 4 ft. long; 12 gage, 5 ft. long; 14 gage, 6 ft. long. Powered by 1½ h. p. motor.

We also build special machines for intricate bending operations.

Take advantage of our experience of over 45 years by sending to us any difficult bending problem you have.

WORLD'S LARGEST MANUFACTURER OF HAND BENDING, POWER BENDING AND POWER PRESS BRAKES

DREIS & KRUMP MANUFACTURING CO.

7440 LOOMIS BLVD. • • CHICAGO 36, ILLINOIS

SEND FOR NEW BOOK "FORMING PRESS DIES AND THEIR USES"

FOR SPEED STRENGTH ECONOMY

FASTEN THAT NEW PRODUCT

WITH *Chicago*

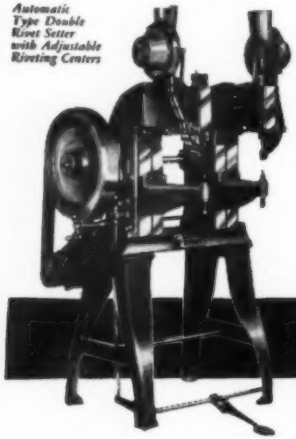
AUTOMATIC RIVETING

Success or failure of your new product in post-war competition may depend on your speed and cost of production. If a fastening operation is involved, Chicago Automatic Riveting will fasten it faster . . assure strongly fastened assemblies at low unit cost. From one to four tubular rivets or split rivets are fed, inserted and clinched in the split second it takes to release a Chicago foot pedal. Several models of Chicago Riveters are adjusted in just a few minutes to handle different sizes of rivets.

Automatic Type Single Rivet Setter

FASTEN ALL TYPES OF MATERIALS

Chicago Automatic Rivet Setters fasten wood to wood, composition to composition, fabric to fabric, metal to metal, leather to leather, or any combination of these materials. They clinch grommets and eyelets, and insert drive screws as efficiently as they set rivets. Plan now to assure strong fastenings at higher speed and lower costs with Chicago Automatic Riveting. Write today, for catalog information.



Automatic Type Double Rivet Setter with Adjustable Riveting Centers

LET US ANALYZE YOUR FASTENING PROBLEM

You can learn, without cost or obligation, how your fastening output may be speeded up, and costs reduced. Just send a blueprint or a sample assembly and ask for a fastening analysis. Our engineers will gladly analyze your particular problem. Production rates can be set up from the report they give. Make use of this expert service, as you plan new products.

Chicago Rivet

CHICAGO RIVET & MACHINE CO.

9610 W. Jackson Blvd., Bellwood, Ill. (CHICAGO SUBURB)

★ A TYPE AND SIZE FOR EVERY PURPOSE ★ OVER 100 DIFFERENT MODELS ★

Sixty million operations without failure—such is the record of this Ross Solenoid-operated Air Valve, attached in 1938 to a Taylor-Winfield welding unit operating in the Zenite Metal Corporation plant at Indianapolis. Faultless performance through seven high-pressure production years.

Ross air valves are engineered and built to give long years of faithful service.

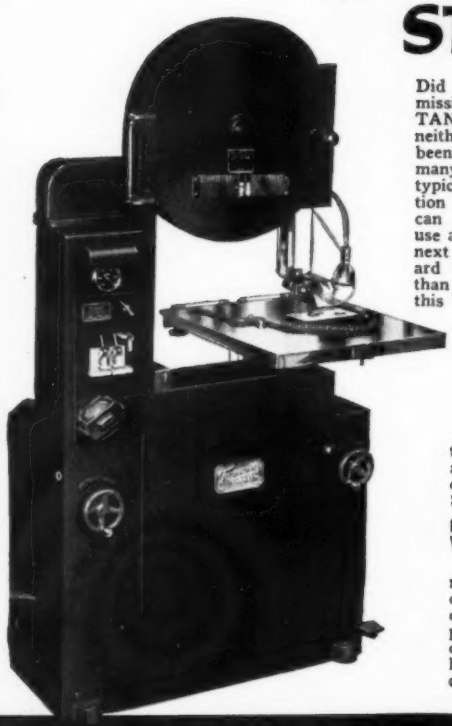
ROSS *Operating* **VALVE CO.**

6480 Epworth Boulevard

DETROIT 10, MICHIGAN

Tannewitz

the DI-SAW with Extra SPEED AND EXTRA STAMINA



Did you ever hear of a transmission going haywire on a TANNEWITZ DI-SAW? No, neither did we, though we have been making die saws for a good many years. And that's just typical of the superior construction of the entire machine. It can take the severest kind of use and always be ready for the next job. Moreover the standard model has larger wheels than customary in machines of this type — a full 24 inches — for greater traction, straighter, faster sawing and more production. Get the complete facts and you'll discover why TANNEWITZ DI-SAWS always show the best possible return on an investment in equipment of this kind. Write for "DI-SAW" Bulletin.

OTHER MODELS TO HANDLE WORK OF PRACTICALLY ANY SIZE

make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work too large to handle on the standard machine. Bulletin on request.

THE TANNEWITZ WORKS

GRAND RAPIDS 4, MICHIGAN

midget IN SIZE — MIGHTY IN PERFORMANCE

New

IDEAL PNEUMATIC TOOLS

Now IDEAL, backed by a third-of-a-century experience, offers a new line of Pneumatic Tools —that present new standards in light weight, in compactness, in perfect balance, and in easy operation. This means *minimum fatigue* for beginner and experienced operator alike.

The new tools include—

The new *Air-Horse* Pneumatic Hammer; a cool working tool—impossible to overload. Many remarkable advantages and improvements too numerous to mention here are detailed in a Bulletin, which will be sent upon request.

The *Air-Horse* Pneumatic Die Grinder; designed as a tool post grinder for internal grinding, finish die grinding and similar work. Also has many uses in machine shops as a rotary file.

Light Weight Defeats Fatigue!

***Air-Horse* Riveting Hammers**

Three sizes—light, medium, and heavy impact. IDEAL'S lightest riveting hammer weighs only 2 lbs., 5 oz. and is only 5⅝" long. Specially designed and built for fast, effortless, high-production riveting. Two Handle Styles—Offset and Grip.

***Air-Horse* Rotary File and Die Grinder**

Weighs only 17 ounces, yet it is a high-speed, powerful, durable tool. Handles wheels up to 1½" diameter. Collet chuck for ¼" shank. Also sleeve collets for ⅛" or 3/16" shank. Operates at 25,000 r.p.m.

Write for Detailed Literature

Machinery Products Division
IDEAL COMMUTATOR DRESSER CO.
3461 Park Ave., Sycamore, Ill.

IDEAL *Sycamore*

Branch offices in principal cities • Consult your local telephone book

BELTS *Cut* BETTER

Four to One!

Yes, and sometimes abrasive belts produce 10 to 1 and 17 to 1 more pieces per hour than abrasive-coated, set-up polishing wheels. It is all in the sharp, tough, uniform factory belt coating and the resilient work wheel, plus a 4 to 1 greater cutting area.

Four to one is an interesting competitive advantage and the conversion to belts is simple and inexpensive. All you need is a resilient work wheel and a backstand idler pulley—floor, wall, ceiling or bench mounted to suit your own floor plan.

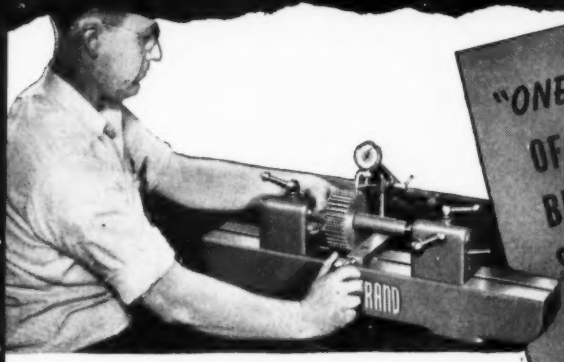
NORTON ABRASIVES

Check Your Own Methods

You can quickly appraise your own facilities and arrange a trouble-free-demonstration on your own product—or better yet—if you are located convenient to Boston, Troy, Cleveland, Chicago, Detroit or St. Louis—we have complete methods and equipment demonstration laboratories at these branch offices reserved for your use. Phone, wire or write for your share of this 4 to 1 speed-up.

BEHR-MANNING · TROY, N. Y.
(DIVISION OF NORTON COMPANY)
QUALITY COATED ABRASIVES SINCE 1872

CHECK *Runout to .0001"*



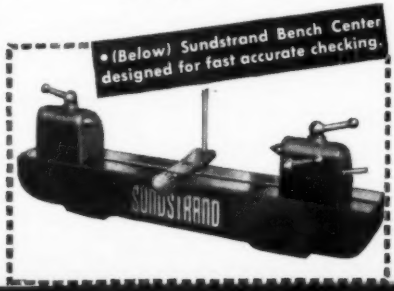
YOU'LL check work between centers easier, faster and within limits of 0.0001" on this improved Sundstrand Bench Center.

● "One-hand control" over all movable elements leaves the operator's second hand free to control the part being checked. Both headstock and tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever on each.

● The tailstock center is quickly clamped or unclamped by means of the front lever, while the end bar retracts the spring-loaded center. In addition, the indicator support can be manipulated with one hand while moving it *away* from the work for loading and unloading, and *against* the work for checking the runout.

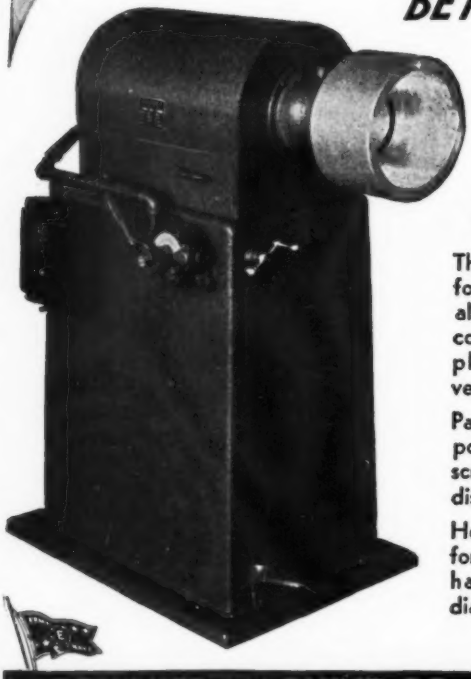
● Center holes of headstock and tailstock are bored together for precision. The heavy ribbed base prevents deflection under clamping and assures a longer lifetime of accurate work. Easy to clean, compact, portable . . . can be placed on bench or on a stand convenient to the work.

Available in 6 sizes from 6" x 18" to 12" x 72". Write for complete specifications and prices today.



SUNDSTRAND
MACHINE TOOL COMPANY
2535 Eleventh St. • Rockford, Ill., U. S. A.

FINISH THESE SHAPES
BETTER! FASTER!



with a
SCHAUER
VACUUM CHUCK
SPEED LATHE

This machine is unsurpassed for polishing and finishing aluminum stainless steel, and copper utensils, bowls, discs, plates, reflectors, and even very thin metal shapes.

Part is held by vacuum and polished while revolving. No scratching. No marring. No distortion.

Holding fixtures are designed for individual requirements, to handle shapes up to 32" diameter.

Write for Description and Specifications.

SCHAUER MACHINE CO.

ORIGINATORS OF TODAY'S
SPEED LATHES

2064 READING RD. • • • CINCINNATI 2, OHIO

A NEW *Grobet* SHIPPING FEATURE

Smallest Shipments Now Fully Protected Until Used - - -

A special tough adhesive paper is now used for wrapping each and every Grobet Rotary File in orders too small to ship in special all-purpose storage boxes.* This wrapping assures that the files will arrive in perfect condition—sealed against scratching—sealed against the elements.

This special Grobet wrapping, a long desired protection for "loose" shipments and small stock handling is another reason for buying GROBET . . . "The Complete Line" of Rotary Files in Mill Cut, Ground Cut and Hand Cut for work on hard and soft metals, wood, rubber, plastic.

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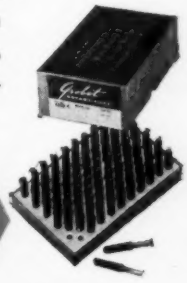


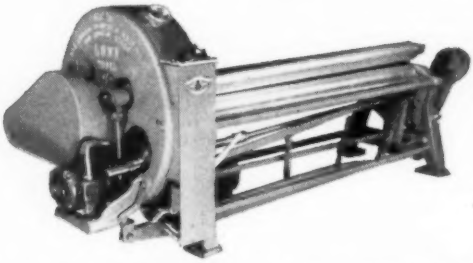
*All purpose shipping container for order of from 50 to 100 Grobet Rotary Files.

GROBET FILE CO. of AMERICA

421 Canal Street 1812 F. L. GROBET **New York, 13 N. Y.**

IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES

IT'S NEW
THE LOWN
HY-PRODUCTION FORMING MACHINE



SPEED UP YOUR PRODUCTION LINE WITH THE FORMER THAT HAS EVERYTHING.

* * * *

SPECIAL FEATURES: Power adjustment on the bending roll. Dial indicator conveniently located for operator's observance when operating finger-tip controls. Power opening and closing of arm or knockdown. Initial type, but different in that you have the minimum flat place on cylinders formed due to the way rolls are positioned. Rolls are so geared that you have perfect mesh even when the feed rolls are widely separated. All three rolls motor driven.

* * * *

AVAILABLE at this time in 5" and 6" diameter rolls in lengths of 42" to 96" ranging in capacity from 3/8" to the lightest metals.

* * * *

MANUFACTURED by the SAN ANGELO FOUNDRY AND MACHINE COMPANY and brought to you through machinery dealers in all principal cities in the United States and Canada. Ask your machinery dealer or write us direct.

* * * *

SAN ANGELO FOUNDRY AND MACHINE COMPANY

San Angelo, Texas, U.S.A.

"Dealers in Principal Industrial Cities"

CROBALT TOOL BITS REDUCE "Down Time"

Crobalt is a cast alloy tool bit (containing principally chromium, cobalt, tungsten, vanadium, zirconium and carbon) especially developed for high speed production. At high temperatures (up to 2000 degrees) Crobalt cutting qualities remain constant.

The cutting edges of a Crobalt tool bit stay sharp longer, and thus assure you of much greater tool life between grinds. This automatically increases production by reducing "Down-time" ordinarily required for changing of tools. Try Crobalt in your shop.

Crobalt bulletin No. 45 contains valuable technical information and quotes prices on standard size tool bits—Send for your copy.

CROBALT INC.

1360 North Main St. Ann Arbor, Michigan

The HARTFORD Quick Acting MILLING VISE

Powerful grip . . . speedy release . . . one hand operation and rugged strength . . . these are but a few of many advantageous features of a Hartford Milling Vise.

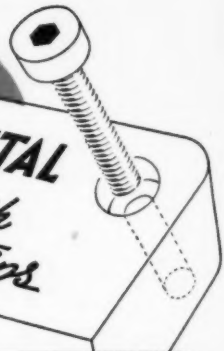
SEND FOR CIRCULAR

Single pieces may be held at either end of jaws without danger of distortion because of the construction of the movable jaw with its ground fitting surfaces. This vise is especially adapted for small arms or small part milling. A thoroughly modern vise for modern production needs, it merits your investigation.

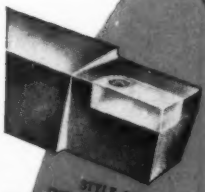
THE HARTFORD Special Machinery Co.

HARTFORD 5, CONN.

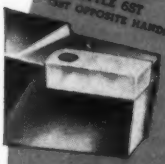
Introducing KENNAMETAL TOOLS *with "Screwed-on" Tips*



TO HELP YOU CUT TOOLING COSTS ON MANY MACHINING OPERATIONS



STYLE 6ST
(3ST OPPOSITE HAND)



STYLE 12ST
(13ST OPPOSITE HAND)

STYLE 40ST
(40ST OPPOSITE HAND)

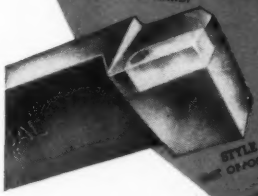
Kennametal tools having tips attached with recessed-head screws —an arrangement developed and perfected by Kennametal Inc.—provide a practical, new way of obtaining even better performance from inherently efficient Kennametal.

The screwed-on assembly is a positive, simplified mechanical fastening of streamlined design. The screw, angularly positioned, serves merely to hold the tip firmly in the shank (heat-treated) against the recess walls, which of themselves resist the main cutting thrusts.

These new tools offer you many advantages, including: Easier, cheaper attachment, in your shop, of tip to tool; greater tip durability and more consistent performance; opportunity to interchange tips quickly in same shank; minimized stock keeping.

Kennametal "Screwed-on" tools are now available in larger sizes of fifteen different styles. Standard tips are made, of different Kennametal compositions, for cutting steel, cast iron, or non-ferrous metals. Catalog particulars and prices are yours for the asking.

STYLE 21ST



STYLE 2ST
(3ST OPPOSITE HAND)

KENNAMETAL
KENNAMETAL Inc., LATROBE, PA.

STYLE 10ST
(8ST OPPOSITE HAND)

STYLE 18ST

STYLE SGS
(STYLES SIL and SWB ALSO AVAILABLE)

Spot · Butt · Arc
WELDERS

Eisler resistance spot welders are available for all types of welding in ¼ to 300 KVA sizes. Write for catalog. Ask about our contract spot welding service.

Ask for Eisler's latest catalog.

33KVA. Air operated. Slide Horn. Adjustable Arms. Weld Timer and Contractor. Excellent for universal applications.

75KVA. Multiple Press Type. Air operated. Weld Timer and Contractor.

Arc Welders
100 TO 400 AMPS.

Butt Welders

FOOT
AIR
MOTOR
OPERATED

Spot Welders

PRESS
TYPE

Spot Welders
FOOT, AIR
OR MOTOR OPERATED

Chas. Eisler

Eisler ENGINEERING COMPANY

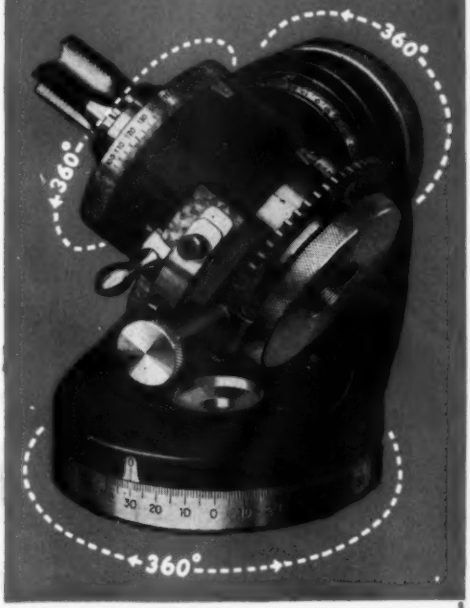
762 SO. 13th STREET NEWARK 3, NEW JERSEY

Cut Tool Maintenance . . . Reduce Manufacturing Costs with The CLEVELAND UNIVERSAL INDEXING HEAD

Now you can regrind your tools . . . in your own shop . . . on any surface grinder . . . in a fraction of the time usually required. Maintaining your tools in tip-top shape, with factory precision regrinds, will help reduce your manufacturing costs.

360° graduations in three planes enable you to regrind or sharpen your tools with any desired angle or cutting edge. Automatic Indexing, provided with a vernier adjustment, permits the re-establishment of concentricity on tools where one or more cutting edges have been unduly worn or damaged.

Only the Cleveland Universal Indexing Head provides three plane 360° settings *plus* compensating automatic indexing. Now available from stock at a *new reduced price.*



New Bulletin Available

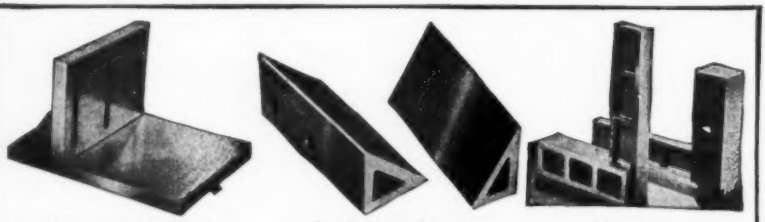
Write today on your business letterhead for copy of the new bulletin on the Cleveland Universal Indexing Head. See how you too can reduce your tool maintenance costs. There's no obligation.

GRINDERS AND FIXTURES, INC.

1249 West 4th St. **Cleveland 13, Ohio**

SOMETHING NEW HAS BEEN ADDED TO OUR LINE OF

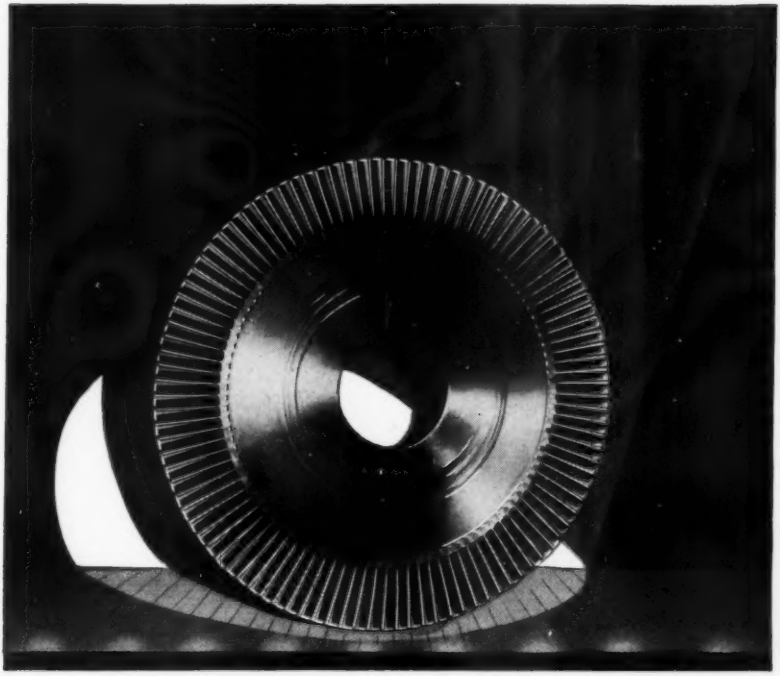
MEEHANITE METAL PRECISION PRODUCTS



Masterangle Plates | Angle Attachments | Try Squares

Write for Literature

ACME TOOL COMPANY 200 CHURCH STREET NEW YORK 13, N. Y.



"In the Spotlight"...

For Jet Propulsion and Gas Turbine Broaching

SPLINE BROACHES UP TO 84 INCHES LONG. Complete Broach Tooling and Engineering Service . . . GAGES, Serration or Spline, male or female . . . Master Gears and Gear Racks . . . Master Index Plates . . . Splined Arbors for gear-grinding . . . Hobbing, Shaving and Checking . . . Production Broaching and Machining. Available from stock, Radius Gages for checking form and hook on broach tooth forms.

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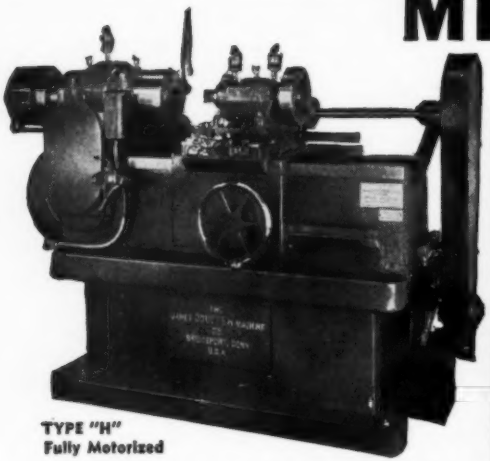
If You can CHUCK it You can THREAD it on . . .

COULTER HOB THREAD MILLER



TYPE "H"
Fully Motorized

for THE RAPID DUPLICATION OF RIGHT OR LEFT HAND THREADS *INTERNAL or EXTERNAL*

Hob thread work can be handled with high speed and precision on this rigid, simple, fully motorized machine. The range of work it is capable of handling is practically unlimited. Any parts that may be held in ordinary chucks, air operated chucks, or special face plate fixtures can be threaded advantageously. Design of the machine permits accommodation of long work.

Work and cutter spindles are driven by individual motors. A wide range of speeds and feeds is available for threading parts of various materials. Maximum external thread capacity is 7"; minimum hole depends on smallest hob practical.

It will pay you to investigate the profit possibilities of Coulter equipment by writing for further information.

The James COULTER *Machine Co.*

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Die set pullers

GONE FOREVER — battered and damaged die sets caused by prying or hammering. **ACRO DIE SET PULLERS** do the job the **FIRST** time. No Delay. Use **ACRO PULLERS** for safe sure separation. They are fast — accurate — positive. War plants using these pullers report savings as high as 50% in time alone.

ACRO PULLERS are indispensable for the grinding, mounting and fitting of punches, enabling the operator to raise punch from die easily, quickly and smoothly, positively holding the set at any desired height.

Order a set today. Convince yourself of the savings you can make in your tool room. **ACRO PULLERS** furnished in three sizes. Write now for more information.

PROMPT DELIVERY

ACRO METAL STAMPING CO.

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CRITERION *Boring* HEADS

Accuracy Accepted

Extremely high accuracy is a standard feature of Criterion Boring Heads. Moreover, original accuracy is maintained far beyond normal expectation. Lead Screw is ground from solid AFTER hardening. Shanks interchangeable. Criterion Heads are in use throughout the nation. Order from your dealer. Request free literature.

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...DOUBLED GRINDING and POLISHING SPEED

This fabricator of stainless steel milk truck tanks was using universal electric tools for grinding and polishing welds.

"How can we get more output with the same man and same pay?", was the gist of the inquiry made to the Rotor Application Engineer. He replied, "With lighter, faster Rotor High Cycle Tools". He demonstrated one. Sold! Report after a year of service:

100% more output because of doubled wheel speed under load . . . and because tool is 8 lbs. lighter and easier to handle in cramped quarters.

Lower maintenance because High Cycle tool has no brushes, commutators or wound rotors.

The Rotor Engineer will be glad to explore *your* possibilities for more output per man per dollar. Feel free to call him in.

Yours for high output,

HI-CYCLE O'TOOL

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VERTICAL MILLS
FOR THE TOOL ROOM
OR PRODUCTION LINE

For use with end mills ⅛" to 1" in steel. Equipped with verniers, as standard equipment in addition to micrometer dials on table actuating screws for locating. Further accuracy available with rods and indicators which can be furnished as extra equipment.

If you want speed and precision on milling, drilling and boring send for a catalog on Index Mills.

Mfd. by Index Machine & Tool Company

12" TOOL ROOM ROTARY TABLE

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

INDEX MILLS

Index Mills participated in all important war production programs from camera and guns to atomic bombs. Ask any owner how they like their Index Mill.

Write to Factory Sales and Distributing Agents for complete information.

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SUPER CARBIDE TIPPED REAMERS

. . . AND GET IMMEDIATE DELIVERY FROM STOCK!

Super reamers are supplied with hardened flutes—eliminating the possibility of them picking up chips and scratching finished surfaces. Shanks are tough rather than hard so they will hold well in chuck or sleeve and present maximum resistance to breakage.
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★ **SOLID CHUCKING REAMERS.**

Stocked in both straight and Taper Shank, in sizes from ⅛" to 1½" diameter. Also stocked semi-finished for quick completion to special size or tolerance.

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Stocked in Taper Shank only in popular sizes from ¼" to 1½" diameter.

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Made with straight or Taper Shanks, and stocked in all popular sizes from ½" to 1½" diameter.

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Stocked in semi-finished condition for quick completion to specified size from ¼" to ¾" diameter.

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Standard design. Not stocked. Supplied in all required sizes promptly.

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Descriptions, illustrations, prices and complete details of Super Carbide Tipped Tools for all types of cutting jobs are given in a series of folders. One or all of these folders will be sent to you upon request. Write today.

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Carbide Tipped Tools

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Speed PRODUCTION UP TO 25% WITH

TORQ MOTORS AND DRIVES

FOR LATHES • SCREW MACHINES
MILLING MACHINES • OTHER
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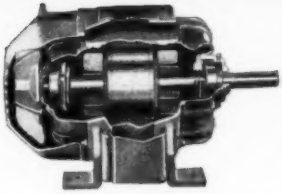

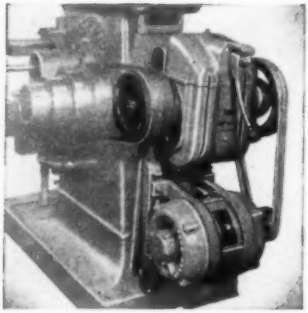

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In most cases we can deliver within three or four weeks. And that means **early** speed-up of your production, thanks to modernization of your present equipment. With Torq drives and motors you may speed production up to 25%, and make the changeover so easily you lose no valuable production time in waiting. You will be prepared for post-war with completely modernized equipment.

ELECTRIC MOTORS: Totally enclosed, fan-cooled, anti-friction bearings.

TORQ-QUA-MATIC DRIVES: 4 selective speeds, 1 to 15 H.P., alloy steel gears, anti-friction bearings. Proven design . . . improves production up to 25%.

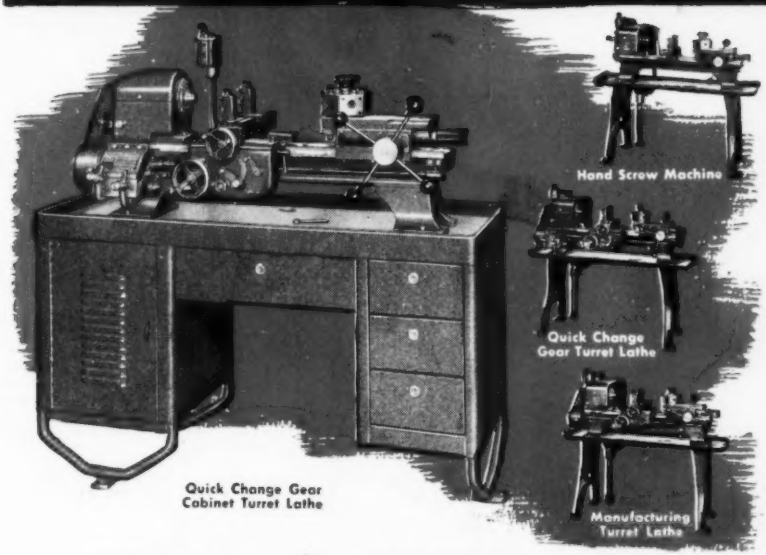
NOTE THESE LEADING USERS

Listed here are a few of the leading American War Plants which successfully use Torq Motors and Drives: White Motor, Cleveland Cap Screw, Cutler-Hammer, Republic Stamping, Valley Mould & Iron, H. B. Sacker Mfg. Co., Thompson Products.

Send for free descriptive catalog.

THE TORQ ELECTRIC MANUFACTURING CO.
6605 CARNEGIE AVE. CLEVELAND, OHIO

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



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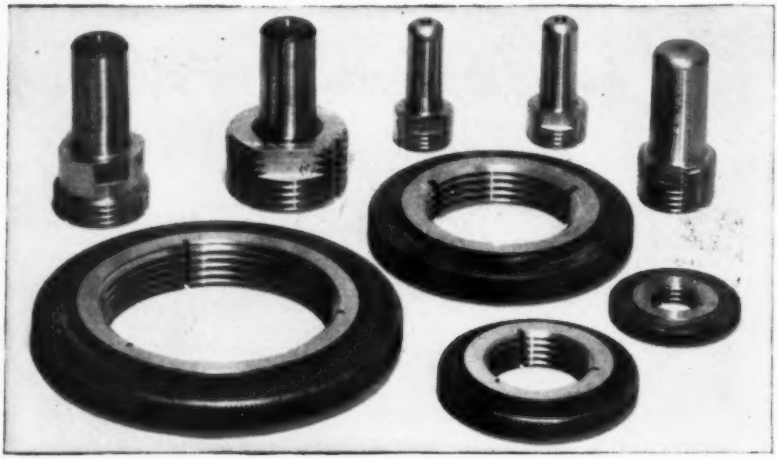
For Speed, Accuracy, Ease and Economy on a Wide Variety of Work

The speed, accuracy and versatility which made Logan Turret Lathes so effective in war production now bring increased efficiency and decreased costs to peacetime operations. Ruggedly, accurately constructed, with heavy hexagonal turrets, they handle a wide variety of operations with the precision essential to fine work. Quickly, easily set up, they minimize time loss between jobs. Heavier, more expensive equipment is released for larger work. Production and efficiency are increased and unit costs reduced. Logan advanced design and rugged, careful construction assure sustained accuracy. Spindles, mounted on special New Departure Ball Bearings, require no adjustment within the full speed range of 30 to 1450 rpm, and permit using high speed carbide cutting tools to full advantage. The two V-ways and two flat ways on the rugged beds are precision ground to within .0005" of parallelism. It is accuracy like this that makes ordering Logan Turret Lathes now a sound preparation for production jobs ahead. Ask your Logan Lathe dealer, or write direct for full information.

SPECIFICATIONS COMMON TO ALL LOGAN TURRET LATHES . . . Swing over bed, 10½" . . . bed length, 43" . . . size of hole through spindle, 25/32" . . . distance across turret head flats, 5¼" . . . 6 positions with adjustable stops . . . self indexing . . . maximum stroke of turret, 4¼" . . . spindle nose diameter and threads per inch, 1½"—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision ground ways, 2 V-ways, 2 flat ways.

LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

IN STOCK . . . FOR QUICK DELIVERY!



PERFEX *Taper Pipe* THREADED RING AND PLUG GAGES!

No waiting for delivery on Perfex Taper Pipe Threaded Ring and Plug Gages! Despite continued demand for the fine accuracy and long-wearing qualities of these Perfex Gages, there are now reserve stocks on hand to meet your immediate needs in sizes ⅛"–27 to 2"–11½.

Top quality high grade steel ground and lapped to high, long-wearing finish, Perfex Gages are rigidly inspected under controlled atmospheric conditions. Manufactured to N.P.T. standards and Army and Navy specifications. Order now for immediate delivery.

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INSIST ON *haskins* QUALITY

Haskins Flexible Shaft Machines meet the demands of modern competition. They are *quality* machines—built of quality material by men of experience, experts in their line. The flexible core, made of special Swedish music wire—the heavy duty rubber fabric casing—the removable casing ends—the ball bearing grease-sealed spindle—the amply-powered motor—these are outstanding features.

And there are literally hundreds of specific operations for these portable tools . . . grinding, drum and disc sanding, rotary filing, wire brushing, buffing and polishing. But whatever the job, a Haskins will do it better—speedily and economically, yet carefully and accurately, too. Send for details.

HS-4, ½ h.p. multi-speed, countershaft unit, 1800 to 7200 R.P.M., mounted bench height on caster base, 360° swivel.

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FLEXIBLE SHAFT EQUIPMENT

THE *Springfield* PRECISION LATHE

Tool Room Lathes are equipped with lead screw reversing mechanism, producing right and left hand threads and feeds. Has automatic stops for both lead screw and feed rod. Oil pan is also included as regular equipment. Bed constructed of High Test Nickel Chrome Gray Iron.

Gear box is tongued, grooved and bolted to front of bed and is the enclosed type to exclude dirt and chips from gears. Wide gears and heavy shafts with ball and bronzed bearings used throughout.

36 changes of threads and feeds are obtained, and in connection with the reverse gears, either right or left hand threads can be produced without the use of wrenches.

Massive tailstock, designed and constructed with long bearings on bed, is commensurate with the powerful headstock. All bearings and ways are oiled from one well.

Regular equipment includes large and small face plates, tool posts, steady rests and all necessary wrenches. Motors are located in large cabinet leg under head stock connected to machine by either V belts or silent chain drive.

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BUILT TO GIVE MAXIMUM VALUE

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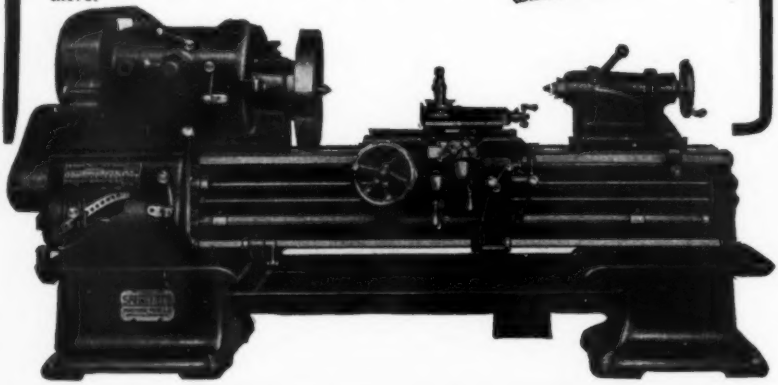
SEND TODAY FOR BULLETIN No. 161

Tells the why and how of Springfield's accurate production.



THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO, U. S. A.

MOTORIZE YOUR MACHINE TOOLS

A FEW OF MANY UNI-DRIVE USERS

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Speed Production-Save Time-Cut Costs

1. No belts to shift. Drives to large step of cone at all speeds

2. Eliminates overhead drive and counter shafts

3. Advantages of geared head —with belt-drive smoothness

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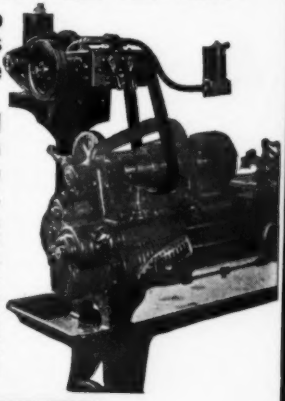
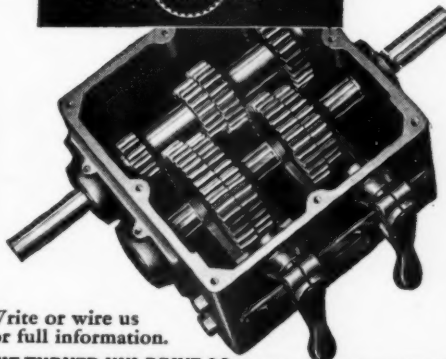


TURNER UNI-DRIVES are quickly and easily installed. Soon pay their cost in time saved and increased production. They do a better power job on Lathes, Milling Machines, Shapers, Turret Lathes, Radial Drills, Boring Mills, Hobbing Machines and various machine tools. Also for Brown & Sharpe and Cleveland Automatic Screw Machines.

TURNER
UNI-DRIVE
Motorizes Machine Tools



Write or wire us for full information.

THE TURNER UNI-DRIVE CO., 3416 Terrace St., Kansas City 8, Mo.
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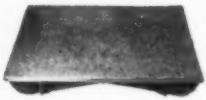
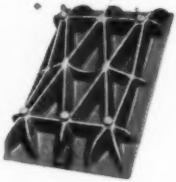
Measuring and Checking Equipment of Highest Quality





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Over 50 sizes, ranging from 7 x 7½ to 96 x 192.

SLOTTED ANGLES

In 19 sizes, ranging from 4 x 9 x 5 and up—in both scraped and ground finish.

BOX PARALLELS

In 15 sizes, ranging from 3 x 4 x 12 and up — in ground finish.

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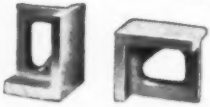

In 10 sizes, ranging from 4 x 3¾ x 5 and up — in ground finish.

Special sizes made to order.

Also, measuring angles, angle plates, vee blocks, straight edges, boring mill parallels, steel parallels, cylinder squares.

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Ready for immediate shipment

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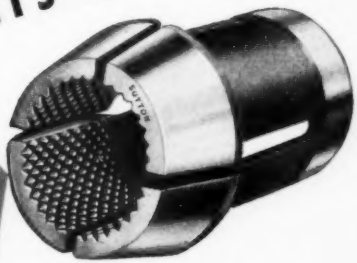
SIGNIFIES SUPERIOR SERVICE IN COLLETS and FEEDERS



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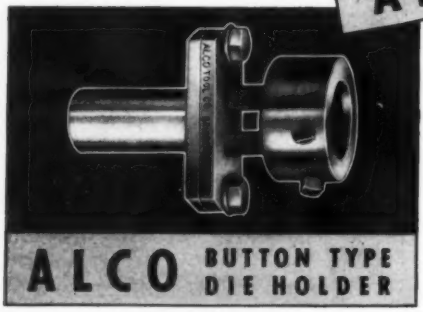
- Supplies quickly and accurately quality collets and feeders that meet your requirements.
- Makes standard and special collets and feeders for all automatics, lathes and milling machines.
- Features diamond serrated collets that grip tighter with less tension — are self-cleaning — reduce spoilage.

"Only Sutton Collets are Diamond Serrated"

SUTTON TOOL COMPANY
STURGIS, MICHIGAN

SUTTON Diamond Grip COLLETS

I can set up **FAST** *with these* **ALCO** **DIE HOLDERS**



PROMPT SHIPMENTS NOW
ON BOTH TYPES

The self-aligning feature of Alco Die Holders is pointing the way for wise manufacturers to cut costs by reducing set-up time. Only three things to do . . . tighten die in die cap . . . run die slowly on work for correct alignment . . . tighten two studs in the flange and start production.

And don't overlook the lowly button die . . . it's simple but efficient when used in the Alco Button Die Holder.

ALCO EFFICIENT TOOLS

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No. 11 LEACH SURFACE GRINDER

With
Hand Feed
Table and
Cross Slide

$493.00

Complete with motor of standard current characteristics. F. O. B. Factory.

Combines . . .

LARGE CAPACITY
and
HIGH-PRECISION
in an
ECONOMICAL,
STREAMLINED MACHINE

SPECIFICATIONS

Maximum distance, wheel to table	12 inches
1 Wheel	8x1 or 8x½x¾ inches
Table Regular Working Surface	24x6 inches
Knee Bearing on Column	6 in. wide, 11½ in. long
Spindle Speeds	2600 and 3500 R.P.M.
Motor, ¾ h.p. Ball Bearing Type	1725 R.P.M.
Weight, complete crated	850 lbs.

Let us send Bulletin giving full details

Exclusive Selling Agents
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE, R. I.

Engineered Hole Location Service Brings Interchangeability to Toolmaking

Complex tools and dies can now be produced like automobile parts—on an interchangeable parts and assembly basis—with the Moore Jig Borer and Moore Jig Grinder working together as toolroom partners.

Moore Jig Borer Spots · Drills · Bores or Reams all Holes with Minimum Tool Changes

Moore Jig Grinder Relocates Holes in Hardened Parts by Finish-Grinding

With both machines working to pre-engineered dimensions, die, stripper and punch plates can be made *concurrently* by several toolmakers instead of progressively as a one-man job. And greater accuracy and economy are achieved. Here's how:

Both the Moore Jig Borer and Jig Grinder employ lead screw measuring principle and convenient system of coordinate hole location. Lead screws hardened and ground to .0002" over 14" of travel and within .00005" in any given inch are built into the machines...assure precise, rapid table settings within .0001".

Coordinate calculations, made by engineering department, are used throughout—in boring the soft pieces and finish-grinding the hardened parts. All work is done to figures instead of to "fit"—promotes greater accuracy and saves operator's time.

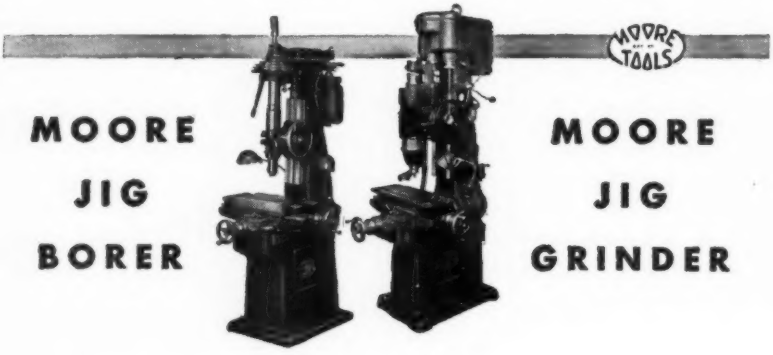
Parts are made concurrently. Errors in hardened pieces are corrected, *not transferred* to other parts. This permits several toolmakers to work on the job at once, speeding die delivery to your press room.

Both machines inspect own work before removal from the machine. By simply inserting a dial indicator in place of the boring or grinding tool and resetting the micrometer lead screws to the original specification, errors in earlier settings are immediately apparent and readily corrected without disturbing the set-up.

Mass-die-production has many other advantages...saves over-all toolmaking hours...lowers tool costs...increases toolroom capacity...prolongs tool life.

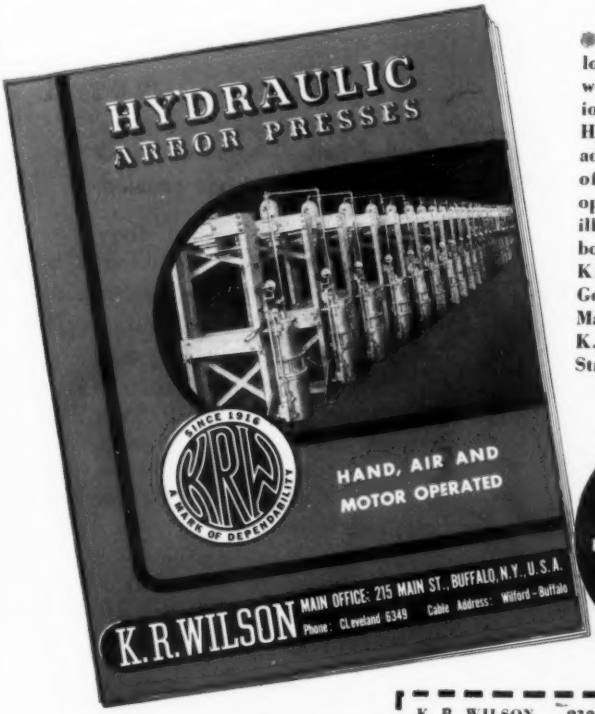
Why not investigate how this Engineered Hole Location Service can increase the productivity of your toolroom and production methods. Write today—

MOORE SPECIAL TOOL COMPANY, INC.
728 UNION AVENUE, BRIDGEPORT 7, CONNECTICUT



NEW KRW HYDRAULIC PRESS BOOK

of Profitable Production Ideas



● This is more than a catalog . . . it is a textbook of workable, practical suggestions on how low-cost KRW Hydraulic Presses can be adapted to solve a myriad of everyday production operations. 32 completely illustrated pages that show both standard and special KRW Presses in operation. Get your Free Copy now... Mail the coupon at once. K. R. Wilson, 213 Main Street, Buffalo 3, N. Y.

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K. R. WILSON, 213 Main Street, Buffalo 3, N. Y.
Please mail me a copy of your New
Hydraulic Arbor Press Catalog.

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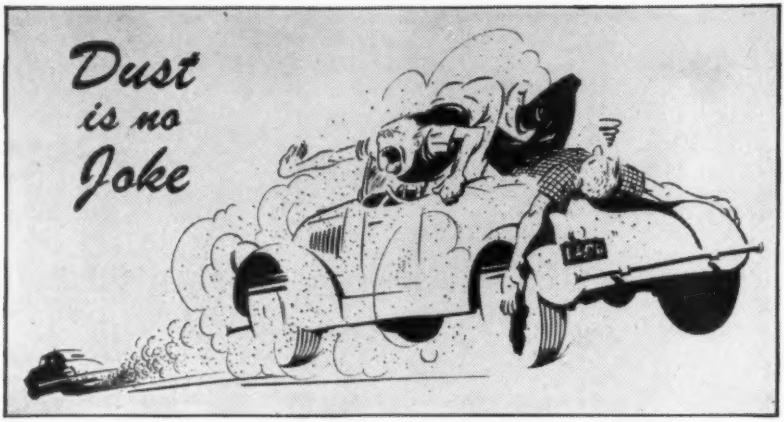

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have proved their ability to solve the abrasive dust problem

Over 10,000 TORIT Dust Collectors are now in use. They are cleaning and re-circulating the air from grinding, polishing and cut-off saws in all types of American industry.

TORIT Dust Collectors fit all machines requiring dust control. Self-contained and compact in design, they are easy to install. They require no extensive piping, and are economical to operate. Get Torit Catalog No. 30 for complete information.

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TORIT MANUFACTURING CO.
303 WALNUT STREET ST. PAUL 2, MINN.

TORIT Dust Collectors
SELF-CONTAINED UNITS

PRECISION REID SURFACE GRINDERS

EFFICIENT SURFACE GRINDING ADDS THE FINISHING TOUCH TO PERFECTION

These REID *Features Assure that Result.*

HEAD ELEVATING WHEEL ON APRON

BRAKE ON ELEVATING HAND WHEEL

SILENT CHAIN DRIVE ON TABLE

BALL-BEARING DRIVE CROSS SHAFT

OIL ROLLS ON TABLE AND CROSS SLIDE FOR EVEN DISTRIBUTION

ADJUSTABLE DUST COLLECTOR SPOUT

STURDY, VIBRATIONLESS STRUCTURE

ILLUSTRATED IS MODEL 2-C REID HAND-FEED SURFACE GRINDER. HIGHLY RECOMMENDED FOR CLOSE TOOL, GAGE, DIE AND CERTAIN PRODUCTION GRINDING.

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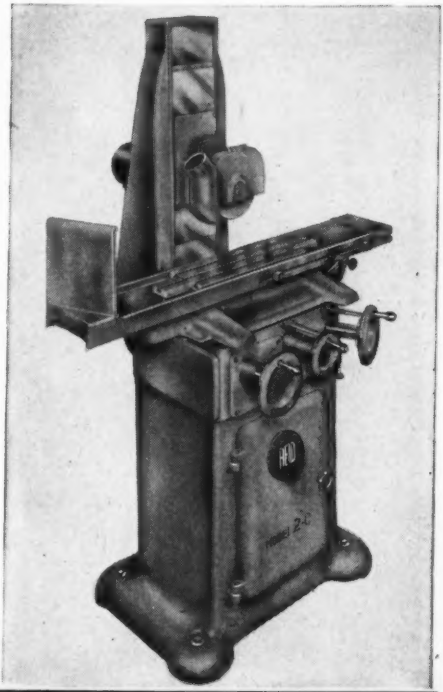

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correct hardness and uniform quality

WHEN tools, cutters and small parts are heat treated in Sentry Electric Furnaces with the aid of Sentry Diamond Blocks, you are assured of clean, scale-free, true-to-size work — and no decarburization. Sentry Furnaces are quick to bring to proper heat — no wasted fuel — no fumes. Are most economical for volume production or tool room work. Sentry Diamond Blocks produce a uniform neutral atmosphere for scientifically heat treating Molybdenum, Tungsten and Cobalt high speed, or High Carbon High Chrome steels to obtain correct hardness and uniform quality.

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FROM SMALL TOOLS

In ARO Pneumatic Tools you get the unbeatable combination of BIG POWER...with small size, light weight and trouble-free performance! Whatever the job—whether drilling, screw-driving, nut-setting, filing, grinding and countless other production operations—ARO does it *faster*-and with *less fatigue!* Each tool ARO-engineered for a special use...precision-built for accurate workmanship. Check your tool-needs now with the complete ARO line. Write for catalog. The Aro Equipment Corp., Bryan, Ohio.

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PNEUMATIC TOOLS

THIS MIDGET SCREW DRIVER

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NEW Aro Model 7000 —"cigar size" weighs only 8 oz., 4⅛" long, ¾" diameter. Capacity No. 1 to No. 6 screws. Fully automatic—No manual throttle. Starts automatically when pressure is applied.

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REDUCED AVERAGE PIERCING TIME ON *SHORT RUN* WORK APPROX. 90%

The two Wiedemann R-7's illustrated are in a line of four which have set new production standards for piercing sheets and plates in the plant of a large manufacturer of electrical equipment.

The R-7 permits 1 person to handle large sheets and plates . . . gauging arrangement positions work by direct reading Handwheels . . . Punch and Die required is positioned by operator through motor controlled turret . . . dimensions are taken from the drawing or from a chart . . . no layout required.

The R-7 Turret Punch Press is unsurpassed in efficiency—if you have sufficient volume of short run* piercing, louvre and similar work to keep the R-7 operating 40 hours a week, the machine will pay for itself in two years or less.

Full details on the R-7 will be sent upon request. In addition, information will be sent gladly on smaller and lighter turret punch presses for handling lighter gauges and smaller material. The same basic economy is inherent in all machines. Write today.

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THE JOB:*

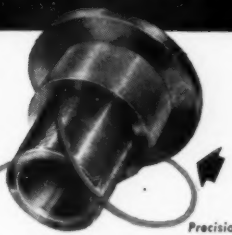
48" x 96" mild steel.
24 openings pierced requiring 6 different shapes and diameters.
Old method. 2 hours and 10 minutes.
Wiedemann Method. 12.57 minutes. (Time includes loading and unloading of material in machine.)
Layout work done directly in the machine and is also included in above time.
Three similar pieces were produced in the same time.

*In general, if the number of pieces does not warrant making a piercing die to do the piercing operation in a single purpose machine, then the job can be most quickly and economically handled on a Wiedemann Turret Punch Press.

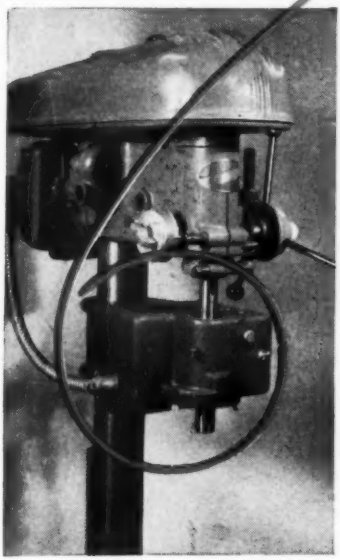
WIEDEMANN TURRET PUNCH PRESSES & GAUGE TABLES

LEAD SCREW TAPPING...

ON YOUR OWN DRILL PRESS!



Precision ground lead screw provides accurate, controlled tapping from 0-80 to 7/8".



With this ROTOREX tapping head you can convert your drill press to a precision tapping machine in a matter of minutes, and consistently produce Class III threads. To change to drilling, simply swing the ROTOREX to one side.

Employing the same principle as expensive tapping machines, the ROTOREX uses a precision ground lead screw for positive, automatic control of tapping leads and operates on a complete automatic cycle. It is rugged in construction, economical and can be operated with unskilled labor.

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6. Foot control frees operator's hand for loading.
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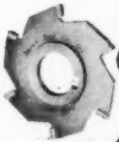

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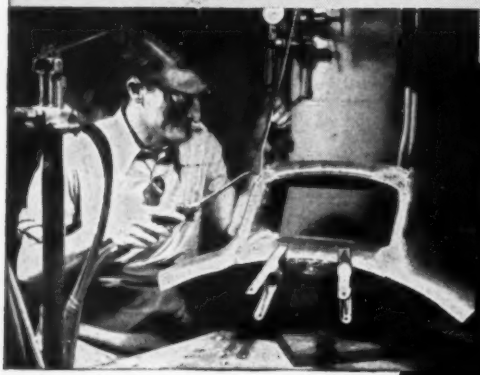

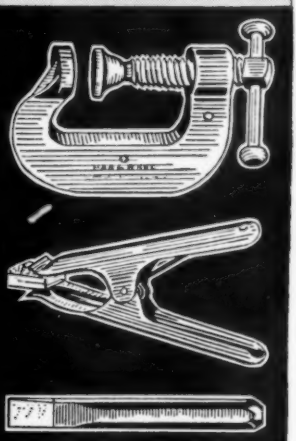

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HARGRAVE *Individually Tested* Clamps are used for hundreds of operations in Glenn L. Martin aircraft plants. Illustration at top shows HARGRAVE Improved Spring Clamps rigidly holding workpiece for a welding job. Top clamp at right is the HARGRAVE No. 43 Welder's Clamp with patented anti-spatter screw. Screw is made of an alloy which resists loading; frame is forged steel heat treated.

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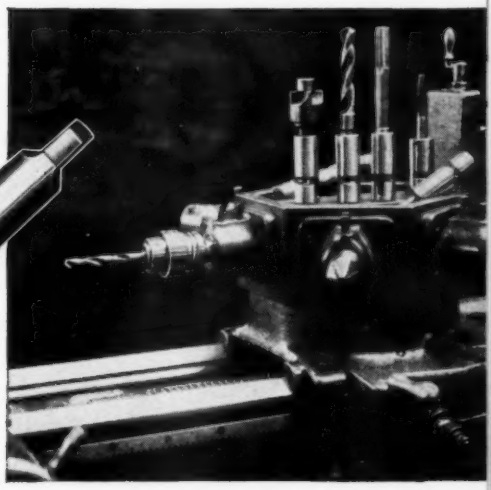
Make them available with

MODERN-MAGIC CHUCK and COLLET EQUIPMENT



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Modern-Magic Quick Change Chuck and Collet Equipment has repeatedly proved its value to turret lathe operation where there are not enough openings in the turret to accommodate all the necessary tools for the job.

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For complete information covering Modern-Magic Quick Change Chuck and Collet Equipment, send for Bulletin No. M-101

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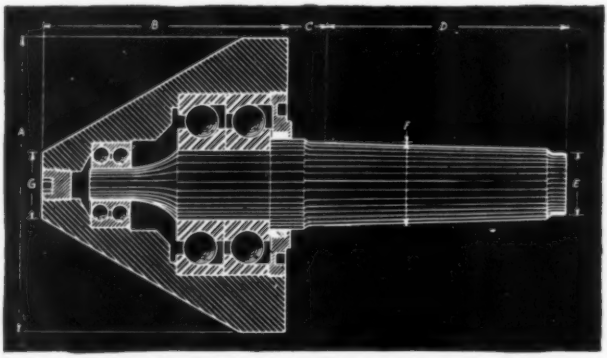

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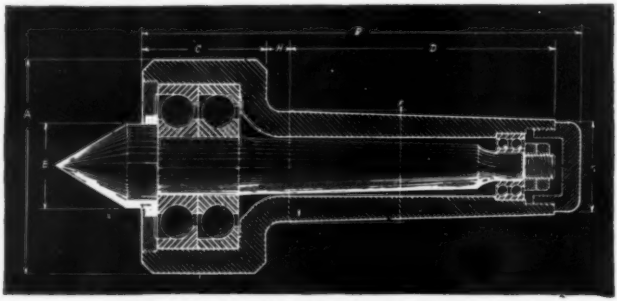
Roofe Bull Nose Centers are used for any tubular machine work, tool joints, oil field or similar jobs. Bearing capacity 2,000 lbs. to 40,000 lbs. Nose sizes to your specifications.



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This McIntyre pressurizing pump can be assembled quicker, easier, better—thanks to design economy made possible by Truarc retention principle.

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Aircraft depend on McIntyre pressure pumps, and Truarc Rings make McIntyre pumps more dependable—making possible fewer, better integrated parts.

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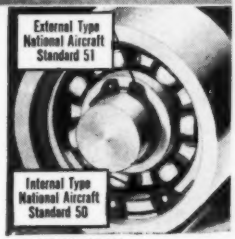

U. S. PAT. RE.—18,144.

Our engineers will be glad to show you how this superior retention principle can be applied to *your* machines and products. Write Dept. M-3.

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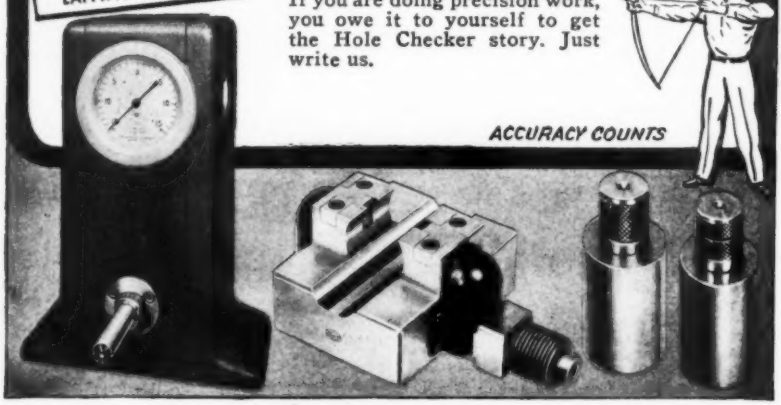

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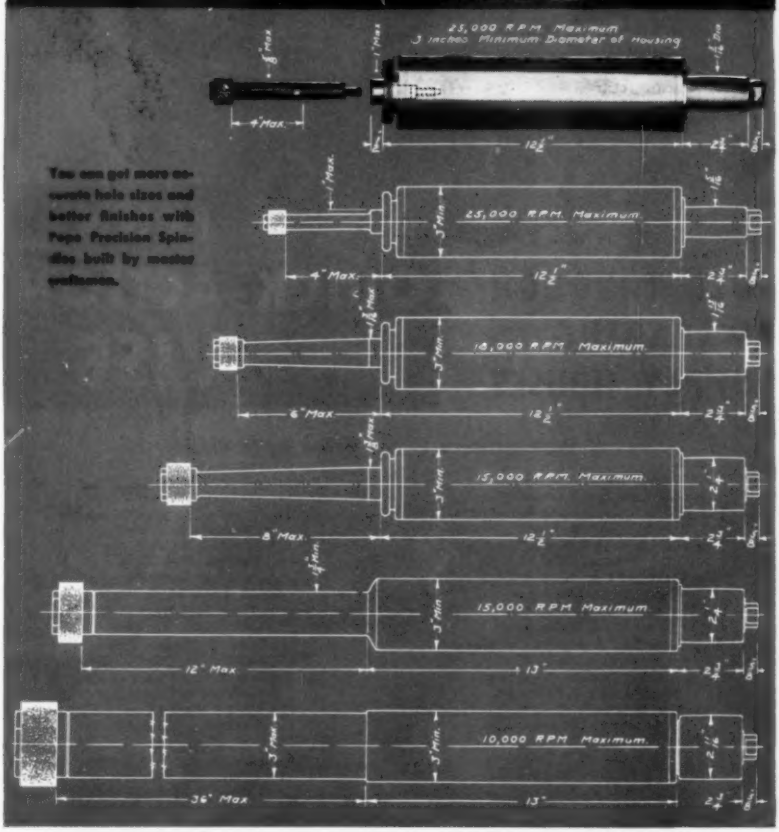

These internal grinding spindles with sealed-in lubrication are available for prompt delivery in a wide range of dimensions within the limits indicated. Tell us which one you want so we can give you a quotation.

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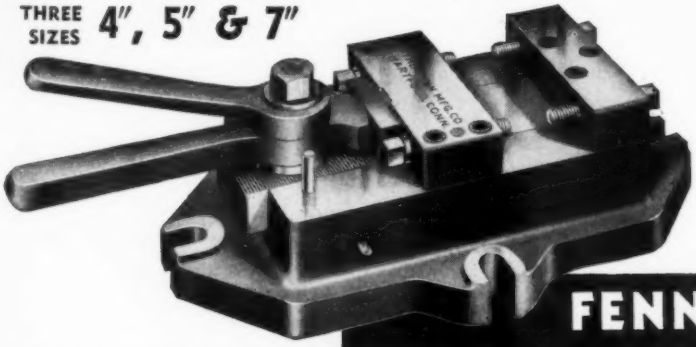

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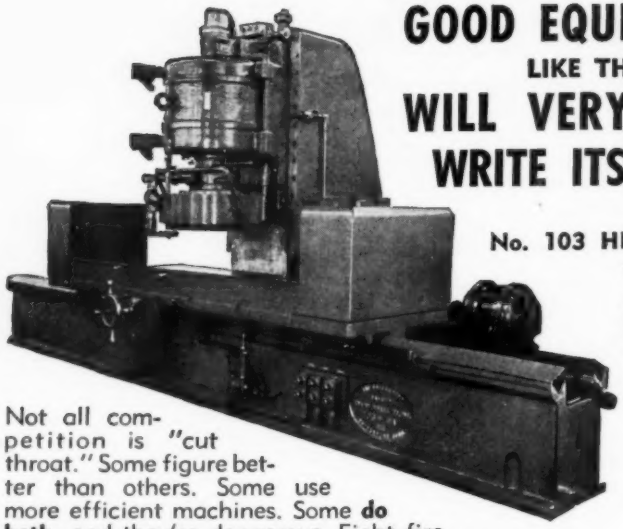

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Not all competition is "cut throat." Some figure better than others. Some use more efficient machines. Some **do both,** and they're dangerous. Fight fire with fire. Back up your estimators with the best machinery you can get. The better the equipment, the cheaper the cost per piece. In metal removal, there is no substitute for quality! Representative of such quality is this heavy duty vertical surface grinder. It produces flat surfaces with precision and speed. Large table capacity. Hydraulic operation. Controls and adjustments all in easy reach. Ample bearings. Plenty of reserve power. Glad to explain fully on request.

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THE BRIDGEPORT SAFETY EMERY WHEEL CO., INC., BRIDGEPORT, CONN., U. S. A.

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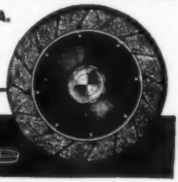
GRINDERS • GRINDING WHEELS • BUFFING LATHES



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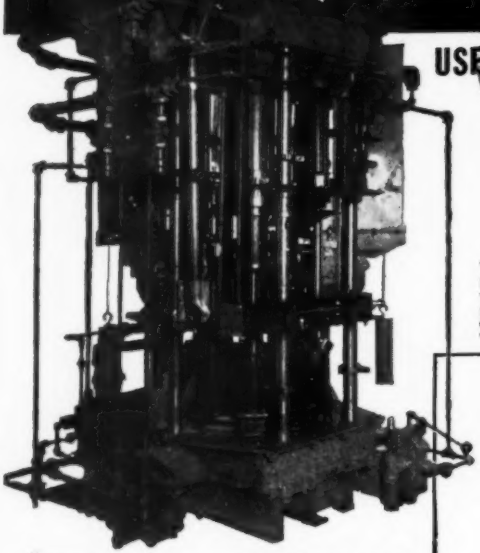
NOW IT CAN BE TOLD

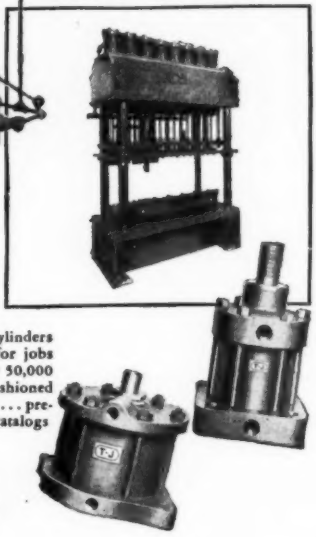
Shell-loading Machines-

USE T-J

CYLINDERS



T-J Hydraulic Cylinders on these machines press different ingredients into shells at very accurate pressures. At left, rotary type press—which also employs small cylinder (shown on front) for indexing. Below, "straight eight" type loading press.



Among the wide range of war production jobs performed by T-J Cylinders is this application on shell-loading machines manufactured by Proctor & Schwartz, Inc., Philadelphia. The machines are hydraulically operated and *entirely automatic*—depending on the high efficiency and accuracy of T-J Cylinders!

Similarly—for hundreds of tough jobs of power movement in industry today—you'll find T-J Air and Hydraulic Cylinders a real time-saver, muscle-saver and money-saver! Ideal for jobs where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Available in many standard sizes and styles . . . both cushioned and non-cushioned types. Backed by 29 years' experience . . . precision-built for unbeatable performance! Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

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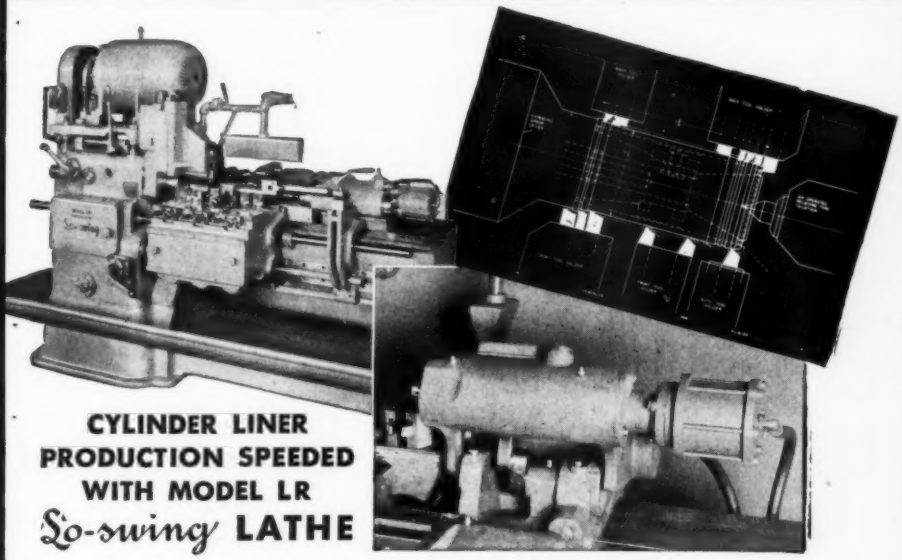
HYDRAULIC AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS

T-J

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



CYLINDER LINER PRODUCTION SPEEDED WITH MODEL LR *Lo-swing* LATHE

PROBLEM: To automatically turn outside diameters, face and groove cast iron Cylinder Liners of various types with Carbide Tools.

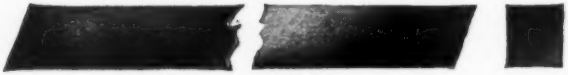
SOLUTION: The Model LR Automatic Lo-swing Lathe, was selected for the following reasons: (1) demonstrated fine performance with carbide tools; (2) ease of setting-up with its SIMPLIFIED CHANGE-OVER MECHANISM; and (3) ease of loading and unloading with the RELIEVING TAILSTOCK which also reduces overhang of the tailstock spindle to a minimum.

The cast iron cylinder liners are delivered to the Lathe with the bore machined to size and the large end faced. They are held and driven with an air-operated, expanding collet arbor which extends the full length of the piece, thus assuring a large area of driving surface which permits high cutting speeds and coarse carriage feeds for fast production. Loading of the parts is simplified with the Relieving Type Tailstock, shown in the close-up illustration and since the driving arbor is bolted to the spindle nose, the operator is relieved of handling heavy stub arbors generally used when the parts are held between centers. The outside diameters and the short taper on the tailstock end of the liners are turned with six tools mounted on the front slides; all facing and grooving operations are accomplished with the tools mounted on the rear slide. The entire operation is automatic—the operator simply loads and unloads the parts and pushes the starting button.

Seneca Falls engineers are always at your disposal to help find solutions for any of your difficult turning operations.

LATHE NEWS from SENECA FALLS

EASTERN'S QUALITY HIGH SPEED TOOL BITS



PRICE EACH	SQUARE SHAPES					PRICE EACH
	Rex MM	Rex AA	Rex AAA	Circle C	Super Cobalt	Milford Rezistor
3/16	$ .05	$ .06	$ .10	$ .20	$ .20	$ .16
1/4	.09	.10	.20	.30	.30	.20
5/16	.14	.15	.25	.40	.40	.28
3/8	.20	.25	.40	.50	.50	.39
7/16	.35	.40	.60	.75	.75	.52
1/2	.55	.65	.75	.95	.95	.70
5/8	.75	.80	.95	1.40	1.40	1.08
3/4	1.20	1.40	1.60	2.25	2.25	1.66
7/8	2.00	2.20	2.80	3.75	3.75	2.84
1	3.00	3.50	4.50	5.25	5.25	4.52
1-1/8	5.00	5.50	6.15	7.00	7.00	6.16
1-1/4	6.50	7.00	8.50	9.00	9.00	

CUT OFF TOOL BITS

SIZE	PRICE EACH
3/32 x 1/2	$ .30
3/32 x 5/8	.33
1/8 x 3/4	.45
1/8 x 7/8	.65
3/16 x 1	1.08
3/16 x 1-1/8	1.45
1/4 x 1-1/4	2.00

HIGH SPEED TOOL BITS

30" 30" 30"

SIZE		PRICE EACH
3/16 x 3/16 x 30"	SQUARE	$2.90
1/4 x 1/4 x 30"	"	1.26
5/16 x 5/16 x 30"	"	1.89
3/8 x 3/8 x 30"	"	2.48
7/16 x 7/16 x 30"	"	3.66
1/2 x 1/2 x 30"	"	4.41
5/8 x 5/8 x 30"	"	6.93
3/4 x 3/4 x 30"	"	9.81

RECTANGULAR TOOL BITS

SIZE	PRICE EACH
1/4 x 3/8	$ .20
1/4 x 1/2	.45
1/4 x 3/4	.60
1/4 x 1	1.00
5/16 x 7/16	.30
3/8 x 1/2	.50
3/8 x 3/4	.90
3/8 x 1	1.35
1/2 x 3/4	1.10
1/2 x 1	2.00
1/2 x 1-1/4	4.00
1/2 x 1-1/2	6.58
5/8 x 3/4	1.20
5/8 x 7/8	1.65
5/8 x 1	2.50
5/8 x 1-1/4	6.00
5/8 x 1-1/2	8.50
3/4 x 1	3.00
3/4 x 1-1/4	6.00
3/4 x 1-1/2	9.50
7/8 x 1-1/8	5.00

EASTERN *Tool & Supply Co.*

176 GRAND ST., NEW YORK 13, N. Y.

TOOLS OF DISTINCTION

We have in stock a complete line of Milling Cutters, Lathe Tools, H. S. Drills, H. S. & C. S. Taps and Dies, Lathe Chucks, Drill Chucks, Files, Special Taps and Dies.

SEND FOR OUR FREE 128 PAGE CATALOGUE

AVERAGE INCREASE IN TOOL LIFE 400%

after Cold Treating in a *Deepfreeze*

Industrial Chilling Machine

Low Cost Chilling Operation Results in Higher Quality Production Tools to Accommodate Stepped-up Production Schedules

Here is what sub-zero temperatures are doing for one of the nation's foremost heat treating organizations. Records maintained since the installation of Deepfreeze Industrial Chilling Machines show that the cold treatment of all types of high speed cutting tools has resulted in an increase in tool life of from 20% to 1,000% with the average being in the vicinity of 400%.

INEXPENSIVE COLD TREATING PROCEDURES BRING OUTSTANDING RESULTS

Results like those listed above are attained by following simple, low cost cold treating procedures. Typical of these is the following:

Preheat 1400-1550° F., depending on analysis. (Double preheating is recommended, using 700-1000° F. first.) Heat to hardening temperatures, depending on analysis, (2100-2400° F.).

Quench in oil, lead, salt, or air.

Remove from quenching medium, at approximately 200° F., and transfer to tempering temperature.

Temper 2-4 hours to hardness specification. (1000° F. minimum.) Allow tool to cool to 150° F.

Cold treat to −120° F., in Deepfreeze Chilling Machine for 3-6 hours, depending on cross-section. Allow part to return to room temperature normally. Repeat tempering cycle, using 25° F. lower temperature for 2-4 hours.

COLD TREATING HAS MANY INDUSTRIAL APPLICATIONS

The utility of sub-zero temperatures is not limited to the treatment of high speed cutting tools. It is used with equal efficiency to increase both the hardness and structural uniformity of any metal part; to speedily eliminate growth and distortion in gauges, gauge blocks, precision instruments of all kinds, etc., to contract metal parts for rapid shrink-fit assembly; for the purpose of testing and to perform numerous additional operations. For free information on how to profitably apply cold treating to your production, contact Deepfreeze Engineering Service.

GET RESULTS LIKE THESE BY COLD TREATING METAL CUTTING TOOLS

100% Increase in Hob Life after Cold Treatment in a Deepfreeze

400% Increase in Tap Life; Finish Improved on Parts Machined after Cold Treatment in a Deepfreeze

1000% Increase in Drill Life after Cold Treatment in a Deepfreeze

300% Increase in Cutter Life after Cold Treatment in a Deepfreeze

300% Increase in Broach Life after Cold Treatment in a Deepfreeze

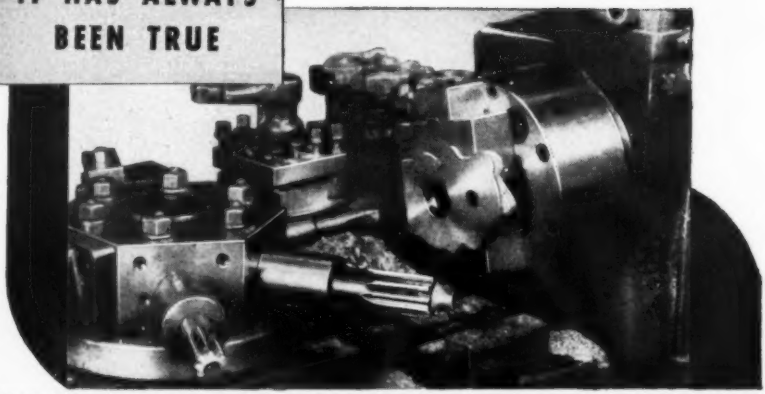
A Complete Engineering Handbook on INDUSTRIAL COLD TREATING

This 42-page Deepfreeze handbook contains all of the data you need to put cold treating successfully to work in your plant. It includes a number of the better procedures, actual results attained by following them, a list of Deepfreeze users and numerous other extremely useful facts. Write today for your free copy.

Deepfreeze

DEPT. MT-3, 2301 DAVIS ST.
NORTH CHICAGO, ILLINOIS

IT HAS ALWAYS BEEN TRUE



THAT "YOU CAN'T MACHINE IT ECONOMICALLY UNLESS YOU HOLD IT RIGHT"

Years ago, "holding it right" meant only having a good husky chuck with a "fair" degree of accuracy and a lot of ingenuity on the part of the set-up man in devising any special jaw devices needed. Today, the fundamentals are the same, but you've got the choice of many specialized types of high precision chucks with accuracy held within at least .003 total indicator error and with time-saving, set-up-saving two piece jaws that permit quick and *exactly* right adaptation to the work piece.

Perhaps you still think in terms of old time methods... many shops do. If so, we are sure a consultation with Cushman Engineers will be a profitable aid in solving your pressing cost reduction problems.

THE CUSHMAN CHUCK CO.
HARTFORD 2, CONN.

A WORLD STANDARD FOR PRECISION

CUSHMAN CHUCKS

MAKE *All* ANGULAR SET-UPS *Faster with* UNIV-ANGLE

PATENTED

You will save many times the cost of the UNIV-ANGLE in reduced set-up time on all types of angular work. With UNIV-ANGLE a highly accurate single or compound angle can be set-up in a matter of seconds. Compare this with the hour or more often required using old conventional methods.

UNIV-ANGLE consists of two hinged plates ground and lapped on all sides to the closest limits. One of these units has a magnetic top plate; the other has tapped holes. The angle is set by a standard gage block inserted between the plates. There are no dials or scales. The setting is positive. There is no pressure to cause distortion. To set a compound angle, simply place a second unit on top of the first and insert the block that will produce the required angle. The accuracy of the gage block plus the extreme precision of the UNIV-ANGLE makes either the single or compound angle very accurate. The compound angle can be switched for right to left hand by simply turning the top unit 180° on its base. The work does not need to be touched.

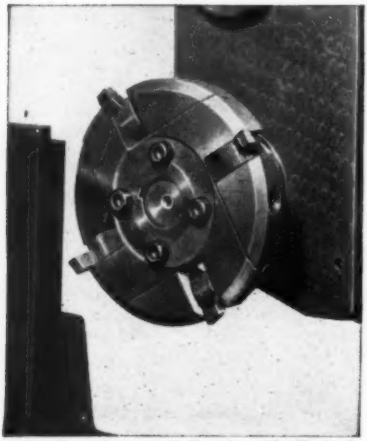
Above: The two UNIV-ANGLE units. They may be purchased separately or in any combination.

Try UNIV-ANGLE in your shop. See for yourself how it saves time and money on all kinds of angular work. Write for complete information and prices.

Robbins ENGINEERING COMPANY

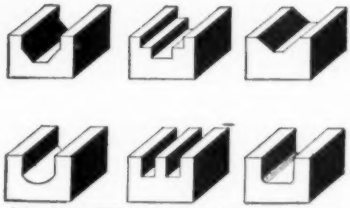
318 MIDLAND AVE. • DETROIT 8, MICHIGAN

NOW--2 NEW EXTRA HEAVY



Designed especially for Shell End Mill Arbors

NEW-FIELD *Universal* FLY CUTTERS



A few of the many cuts that can be made in one operation with the New-field Fly Cutter.

FOR SLOT CUTTING — STRADDLE MILLING — FLAT SURFACES — ON ALL METALS AND PLASTICS

These new EXTRA HEAVY CUTTERS add strength for heavier machining. Like other models they use standard high speed steel or carbide bits — eliminate need for special cutters — speed production — cut maintenance and down-time costs.

Fly-wheel action increases cutting momentum — gives more precise finish — less heating of the finished surface. Adaptable for high rate milling on all classes of metals and plastics.

The perfect form of multiple fly cutter — eases load and impact on milling machines, lengthens cutter life between grinds, permits more chip removal per horse power.

Regular models 4" to 10" diameters — 5/8" and 1" width. Extra Heavy, 6" and 8" diameters, 1 3/8" width. Write for latest descriptive bulletin.

NEW-FIELD MACHINED PARTS CO.

General Offices: 549 W. Randolph St., Chicago 6, Ill.

Factory: 7160 Melrose Ave., Los Angeles 46, Calif.

Export Division: 80 Broad St., New York 4, N. Y.

THE TREND IS TO NEW-FIELD

New Porter-Cable Abrasive-Belt SURFACER

- **Combines High Speed with Precision!**
- **Uses simple jigs.**
- **Performs many operations Freehand.**

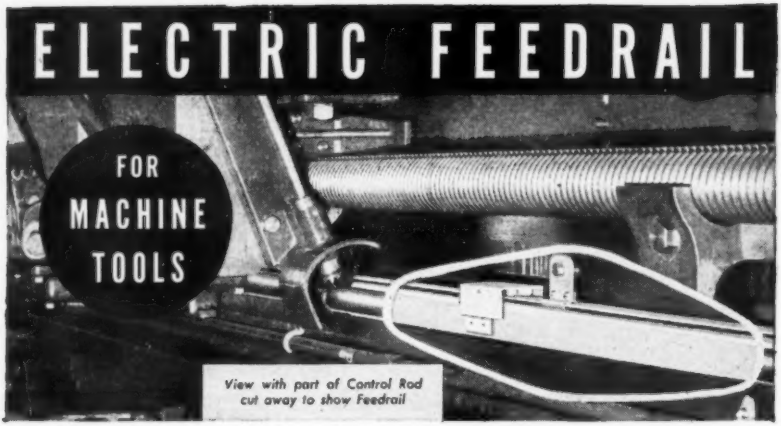
● Dramatic proof of the superiority of the new PORTER-CABLE Wet-Belt Surfacing technique is offered by E. G. Holmes & Co., Ithaca, N. Y. A specific illustration of their problem is illustrated at left. At the right is the machine, Model BG-8, which did a big war-time production job. This machine, equipped with Automatic Feed Table, increased production on the flat surfacing operation from 30% to 35%. Rejects and costs had been running high. On the PORTER-CABLE BG-8, finish was so improved that a $5 increase was given. Former reject quota—20% to 25%. After BG-8 was introduced, rejects totaled 2 in 18 months! Tolerance .001" overall of 52 sq. in. of ground surface. Stock removal .003" to .005"; 80 grit first cut, 180 grit finish. Coolant: soluble oil and water, 30 to 1. Says Mr. Holmes, "Belt cost so little I don't bother to keep track"!

● Millions of tiny points—each a separate cutting tool—travel at terrific speed across a surface, while each takes off its share of the material. Coolant holds down heat. Rigid precision can be maintained to .0005"—an essential point that marks the great improvement of this method! For production line or job shop, it's a labor-saving, cost-cutting, better way to remove stock and impart finish. On many operations stock removal and final finishing are accomplished in the same operation.

A new piece of literature, which illustrates and describes in detail scores of operations which have been done better by this new method, is FREE to interested men in the industry. A postcard will bring you fully illustrated, fully annotated PROOF of the PORTER-CABLE Method. Ask for your copy at once!

PORTER-CABLE Machine Co.
300-3 Exchange St., Syracuse 8, N. Y.

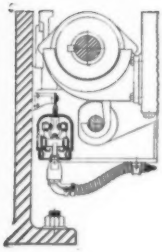
ELECTRIC FEEDRAIL



View with part of Control Rod cut away to show Feedrail

Feedrail is an enclosed electric busway that can be mounted directly on or under moving carriages for grinders, lights or traverse power.

Feedrail provides a three way safety factor for machine tools. It is guarded from mechanical and electrical injuries. It is protected from dust and liquids. It is ruggedly built and eliminates open or loose wiring.



TIME-TESTED AND APPROVED

Feedrail has been in service on cranes, hoists, machines and portable tools for many years.

It is tested and approved by the Underwriters' Laboratoreis, Inc. The label of approval appears on every section of Feedrail. It is recommended by leading safety engineers.

FOR ALL MACHINE TOOLS

Feedrail operates equally well in both the horizontal and vertical positions. Curved track is used successfully for circular machines and conveyors.

ASK FOR FEEDRAIL MACHINE TOOL CATALOG NO. 17.

ELECTRIC FEEDRAIL

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company

125 BARCLAY STREET • NEW YORK 7, N. Y.

"LENOX"

Skip-a-Tooth

TRADE MARK

BAND SAW BLADES

This type of saw has coarse teeth . . . 2, 3, 4 and 6 per inch.

Especially adapted for soft metals that have a tendency to stick or clog in the Gullets of the saw teeth.

Advantageously used on many operations in sawing.

Non-Ferrous Metals		Hard Woods
Aluminum	Carbon	Fibre
Magnesium	Brake Lining	Asbestos
Plastics	Hard Rubber	Plywood
Soft Brass	Sponge Rubber	Builder's Board

"Skip-a-Tooth" Band Saw Blades are advantageously used on soft sticky materials inasmuch as the tooth spacing with its wide gullet permits freer chip clearance than the conventional even tooth spacing.

Buy Through Your Mill Supply Distributor

AMERICAN SAW & MFG. CO. SPRINGFIELD 1, MASS.

MADE TO YOUR "MEASURE"
TROUBLE FREE ACTION ASSURED

WELCO custom-built collector rings are designed to fit special and specific requirements. Come in all sizes . . . carry current of 5 to 200 amperes. Hard bronze material is used for the ring; brass for the brush holders carrying the current; Bakelite for insulation. We can furnish 2 to 12 rings on one stud, complete with brush holders, brushes, studs for supporting the brush holders and stud rings. The collector rings can be assembled as a unit on one hollow tube, with threads on one end and insulation bushing on other. Let us know your needs . . . we'll meet 'em!

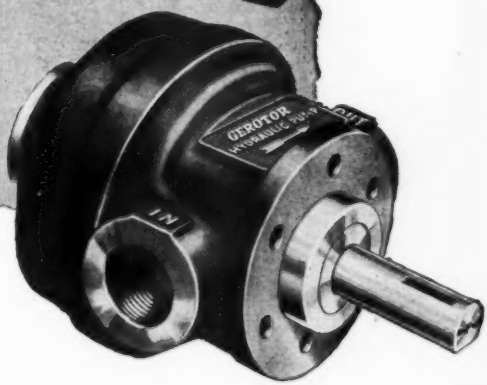
THE B. A. WESCHE ELECTRIC COMPANY
1628-8 Vine St. **Cincinnati 10, Ohio**

GEROTOR
HYDRAULIC PUMPS

are "working partners" in many important jobs

Straight across the country, in many fields of industry, you'll find Gerotor Hydraulic Pumps doing an outstanding job as the working partner of important industrial equipment. Specified as standard equipment on these industrial machines, Gerotor transforms an intricate pump problem into a dependable pump performance.

If you have a pump problem that is holding up your production, consider Gerotor's low cost operation. And let Gerotor's staff of engineers show you how these famous pumps can do a better job for you.



GEROTOR MAY CORP., BALTIMORE 3, MD., Plants at Logansport, Ind., Baltimore, Md.

Streamlined PRODUCTION

with the

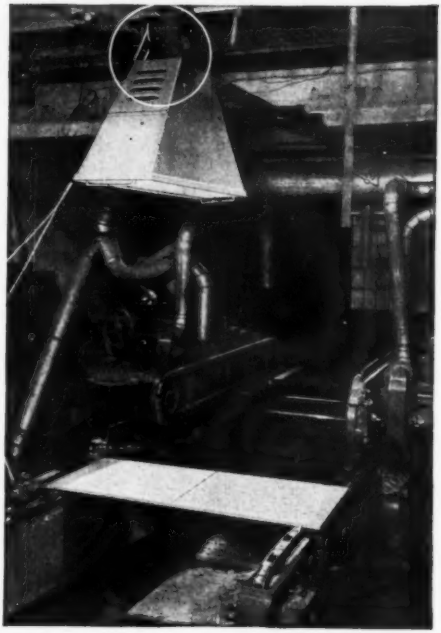
New CARTER TILTING DEVICE

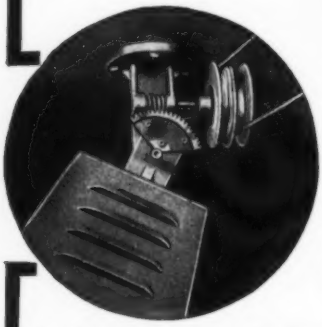
for use with the

CARTER GUIDE LINE LIGHT

SIMPLIFIES layouts, readily sets base or center **shadow** lines where needed on

- **TANDEM SAWS**
- **DOUBLE END TENONERS**
- **MATCHING TABLES**
- **TRIMMING TABLES**
- **DRAFTING ROOMS**





• **The sharp, black shadow line of the Carter Guide Line Light can be cast to either right or left of center by the new Tilting Device.**

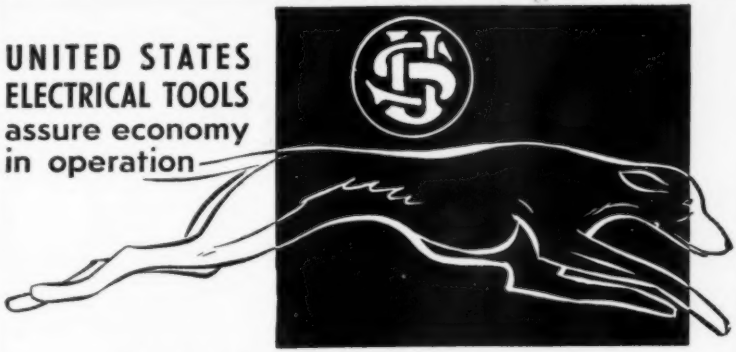
• **Center lines are easily adjusted to stock size, speedily changed to base line position, or cast to show the exact path of a saw before cutting — to choose the best cut, avoid flaws, prevent waste.**

• **Block out choice areas without effort by using shadow lines cast at right angles. Complete illustrative data on light and tilting device sent promptly upon request.**

CARTER PRODUCTS COMPANY

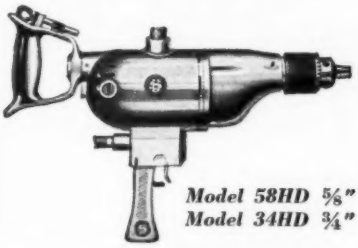
960 Michigan Trust Building **Grand Rapids, Michigan**

UNITED STATES ELECTRICAL TOOLS assure economy in operation



LITHE of line as a greyhound . . . and as speedy . . . sweet running . . . long-lasting . . . without unnecessary parts to cause extra maintenance or replacement costs . . . ruggedly strong for unhesitating and unvarying performance.

HEAVY DUTY DRILLS



Model 58HD ⅝"
Model 34HD ¾"

Super-powered, especially designed for heavy production work or maintenance. Ball bearings on armature. Chuck spindle mounted in two radial thrust ball bearings. Chrome nickel steel gears, heat treated, packed in grease and sealed. Two pole quick make and break trigger switch. Momentary switch, if desired.

REGULAR AND HEAVY DUTY DRILLS

Model 14RG ¼" Regular

Ball bearing throughout. Quick make and break trigger switch.

Model 14HD ¼" Heavy Duty

Ball bearing throughout. Double pole trigger switch, automatic release, thumb latch.

The UNITED STATES ELECTRICAL TOOL *Co.*
CINCINNATI, OHIO

9,000

ABOVE at top is a view in the ACF Brill Motors Company plant showing Federal Welders in production. 54" Federal is in the rear . . . Closeup shows a full extra-length aluminum door being completely welded in the new Federal 84" Spot Welder.

THE Federal MACHINE

Aluminum Spot Welds Per Coach Prove Value of Federal Welders...

The generous capacity, passenger comfort and strength built into modern aluminum coaches by the ACF Brill Motors Company of Philadelphia call for the ultimate in aluminum fabrication. Naturally, resistance welding is specified for a large share of the work. 9,000 aluminum spot welds are required to make a single body. They must be absolutely failure-proof, and, as assembly components are large and costly; the quality of each individual weld must be certain. The newest of the many Federal Resistance Welders installed in the Brill plant is a three-phase condenser discharge stored energy spot welder, with 84" Throat Depth . . . the largest of its kind ever made. It was installed because of the results achieved with a previous 54" Federal, which it now supplements in daily production.

Full extra length doors, full side and end panels, as well as a great many smaller pieces are handled on the big machine. Federal Engineers developed a design so rigid that despite its "reach" deflection is less than on smaller welders. The special requirements of aluminum welding, exactitude of pressure and fast positive follow-up, are achieved so well that rejections are held to a minimum. This is typical of fabrication with Federal Resistance Welders, whether it be spot, projection, flash, butt, seam or "gun" welding. In every branch of the modern metal working field, this sort of efficient production of quality goods is proving that . . . in resistance welding, the name of authority is

Federal

AND WELDER COMPANY

216 DANA STREET • WARREN, OHIO

RECONVERT COSTS, TOO!

Save Time and Labor with

Enco LATHE TURRETS

Model HD-2

Enco All-purpose Multiple Tool Holders are ideal for both production lots . . . or single pieces. On one-operation jobs, tool change time is saved by mounting duplicate tools.

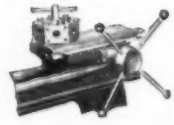
Use of Enco Turret Tool Posts helps to reconvert machining costs to a new high-profit basis. **You get more minutes of productive lathe time per hour.** Complete jobs are set up at one time. Enco 12-station indexing avoids costly tool switching and recentering. Tools used most frequently (facing, turning, threading, boring, etc.) remain on center at all times — ready for use. These savings mean an extra profit on every job.

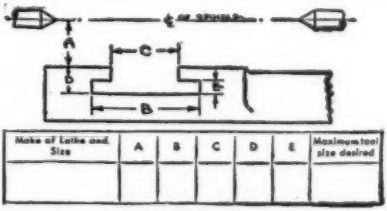
"A" dimension range (From diagram on this page)	MODEL 6-S 2" to 3-1/8" incl.	MODEL 4½-S 1-9/16" to 2-1/2" incl.	MODEL 3½-S 1-1/8" to 1-3/4" incl.	MODEL 2½-S 7/8" to 1-5/16" incl.	MODEL H 7/8" to 1-5/16" incl.
LATHE SWING	16" SWING & UP	13" to 16" SWING	10" to 13" SWING & BENCH LATHES	BENCH LATHES	BENCH LATHES
TOOL SIZE RANGE	5/8" to 1-1/4" or No. 2 toolholder 3/8" square bit — High speed or carbide. (Where no tool bit size is specified, turret will be furnished for No. 2 Tool Holder.)	3/8" to 3/4" (Where no tool bit size is specified, turret will be furnished for 3/4" tool bit.)	1/4" to 1/2" (Where no tool bit size is specified, turret will be furnished for 1/2" tool bit.)	1/4" to 3/8" (Where no tool bit size is specified, turret will be furnished for 3/8" tool bit.)	1/4" to 3/8" (Where no tool bit size is specified, turret will be furnished for 3/8" tool bit.)
SPECIFICATIONS	4 tool, 12 positions 6" square Mac-ite Tool Post Screws Packed in crate Shpg. wt. 37 lbs. **Price $99.00**	4 tool, 12 positions 4-1/2" square Packed in carton Shipping weight 16 lbs. **Price $49.50**	4 tool, 12 positions 3-1/2" square Packed in carton Shipping weight 8 lbs. **Price $35.00**	4 tool, 12 positions 2-1/2" square Packed in carton Shipping weight 4 lbs. **Price $23.00**	6 tool, 12 positions 2-3/4" hex Packed in carton Shipping weight 4 lbs. **Price $28.00**

Prompt delivery can be made on all Enco Lathe Turrets. When ordering, give all dimensions and tool size.

Now Ready! —

Enco HEXTURRET — the better bed turret!





Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

Write Department 23. Ask for catalog showing 30 models for all lathes.

ENCO MANUFACTURING COMPANY

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Featured In This Issue

MODERN TURRET LATHES by John E. Hyler is a review of the equipment available in this field. Typical machines and jobs will be discussed in succeeding installments. Of course, it is impossible to cover more than just a few of the common turret lathe applications in a series of articles of this scope but it is hoped you will find this material interesting and helpful. See page 123

•

BALLS are used in a great many different ways in modern machines and equipment. Many of these applications have been reviewed by H. F. Williams in previous articles in this unusual series. He presents some additional applications in the current article which commences on page.....139

•

INDUCTION HEATING is being used in a great many ways, as visitors at the recent Cleveland Metal Show learned. Some users perhaps may have wondered about the effect of frequency on the work. Dr. Russel A. Nielson, Manager of High Frequency Laboratory, Westinghouse Electrical Corp., Los Angeles, gives a lot of helpful data and shows how to figure effects of the different frequencies in the story beginning on page.....172

•

COMPRESSED AIR is coming into wider use in many industries. There are certain jobs for which it is especially adapted. At least one member of the screw products industry makes good use of versatile air power. The story and pictures which were supplied by the Compressed Air and Gas Industry will be found on page....209

•

"SPEAK UP" is the topic discussed by Edmund Mottershead in the current Foremanship article. He gives some constructive suggestions on conversational voice training in the story beginning on page.....220

DRAWING ROOM KINKS by H. F. Williams offers some helpful recommendations for the most effective handling of tracing paper, cloth and other drawing supplies. See page.....234

•

THE TAX HORIZON is analyzed by Arthur Roberts in a timely article. He views and discusses the prospects ahead and gives some constructive suggestions in a story beginning on page 240

•

"LET'S TALK SHOP" is the regular monthly discussion of matters interesting to most shop men. Here you will find several new hints and kinks. See page 254

•

GEAR RATIOS with special regard to Thread Grinding Machines, were discussed in a recent article by John W. King. This month he offers some supplementary observations which should be helpful in calculating your ratios. Mathematically inclined readers will find some interesting figuring here. See page 282

•

WHAT'S NEW is a regular monthly array of new tools and new equipment. This section includes several machine tool innovations that may help to trim production costs, including several new Monarch Lathes, a new Bryant Grinder, a new crankshaft lathe by Wickes, etc. It starts on page 286

•

NEW HORIZONS is a short article by David T. Armstrong presenting some food for thought. See page.....298

•

MECHANICS THRU THE AGES, see page 392

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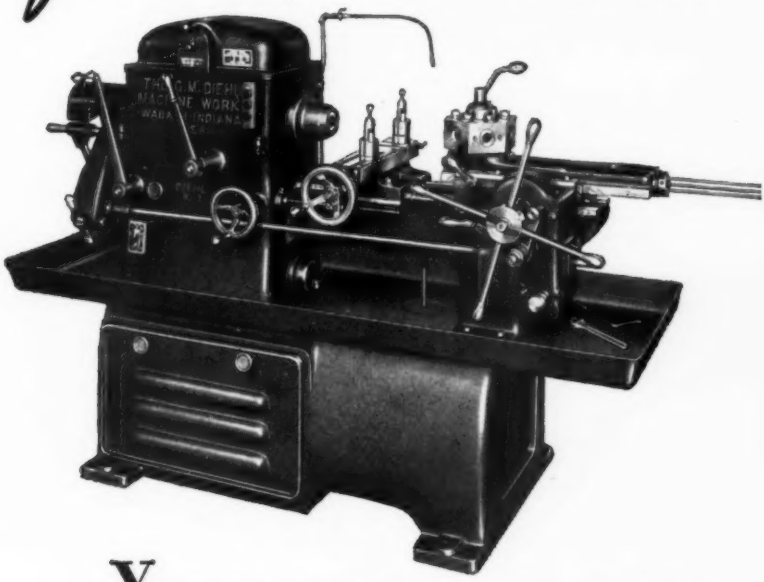
PRODUCTS INDEX—an easy short cut to the machines you're seeking. See page 394

Use DIEHL TURRET LATHES for those Production Jobs



YOU can't beat Diehl for smooth accurate cutting to rigid specifications . . . just the lathe for those "production" jobs. In addition to its high speed precision performance, it works right alongside other No. 2 lathes of standard make —using same tooling, including collets. Write today for complete specification folder and details.

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AS THE EDITOR SEES IT

HEADLINES recently heralded the end of the steel strike. Even tho there are deadlocks in many other industries, the industrial picture brightens as the basic steel industry moves to resume production.

The steel workers get more pay—the price of steel is to be boosted. Until suitable adjustments are made, this jump in the cost of steel will impose some hardships on fabricators and other steel users.

Couldn't all of this have been accomplished without such a wanton waste of labor man-hours? It is to be hoped that early settlements will be made in some of the other strikes that have been blighting reconversion efforts.

The recent national metal show in Cleveland was the first major post-war industrial exhibition, as well as one of the greatest trade shows the world has ever seen.

It was an impressive preview of materials, equipment, instruments, machines, and techniques that will have a vital bearing on our post-war world.

One impression gained after walking thru acres of exhibits is that heat treating has traveled a long way from the early blacksmithing days. Recent developments in oil, gas and induction heating—improvements in the disposition of fumes and dust—new advances in the handling of heavy, bulky materials — precision instruments for checking and recording have eliminated most of the drudgery and guesswork.

Conspicuous thru the show was a greater variety of instruments and equipment for checking and testing manufacturing processes from raw materials, thru to the surface finishes of completed products. There were many arresting exhibits of cutting tools, including all the latest carbide developments. Abrasives were well represented. There were new items in welding and flame cutting equipment.

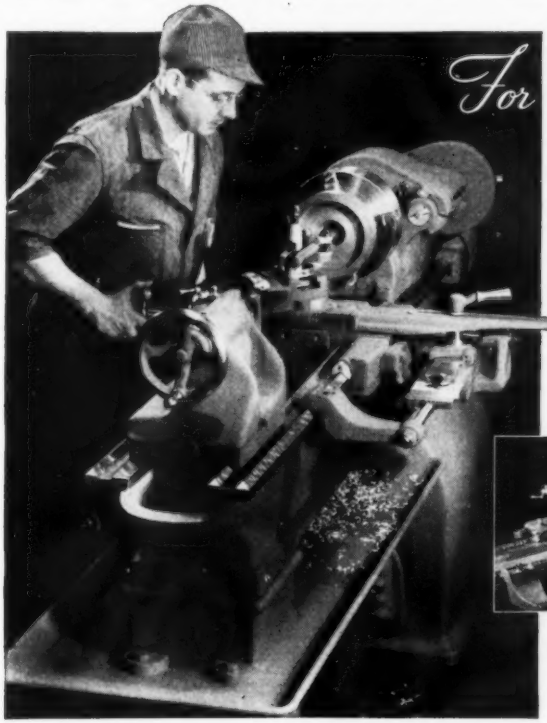
It was not a machine tool show and yet there were some interesting new tools. Included were some of the new smaller, lighter tools which are so useful as auxiliary equipment, handling the smaller jobs so capably as to release the larger tools for heavier work.

The technical sessions presented the answers to many reconversion problems.

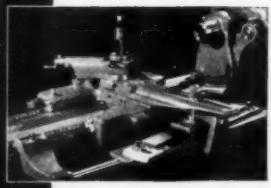
The American Society for Metals deserves credit for staging an exhibition that will be an inspiration and a guide to post-war production.

Wesley G. Paulson

SOUTH BEND LATHES



For Accuracy Versatility Dependability



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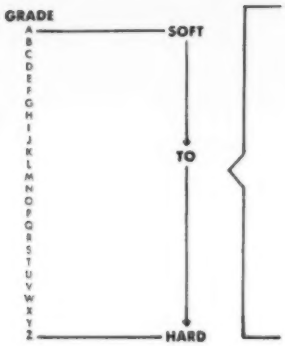

There's more to grinding wheel

The A, B, C's which appear as identification on a grinding wheel help simplify proper grade selection. By clearly showing relative hardness, they make it easier to select the correct wheel for the job. That's one reason wheels by CARBORUNDUM are plainly marked. But, there's more to it than the old chestnut, "the softer the metal, the harder the wheel." It's not that easy.

You realize, for instance, that wheel speed itself affects grinding action. The same grade reacts differently at various speeds. The condition of the machine and the amount of vibration can make a difference. Desired finish...required tolerance must be considered. Coolant conditions vary. The actual type of operation—snagging, surfacing, internal grinding or whatever it is—influences practical selection.

Yes—there are many important factors to check before you can be sure of the right grade designation for the job.

A good rule for good grinding... **CALL**

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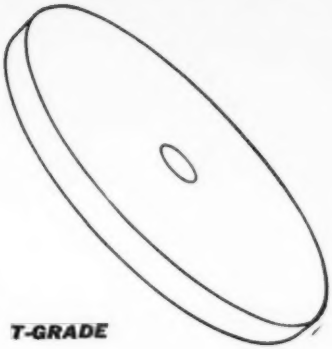

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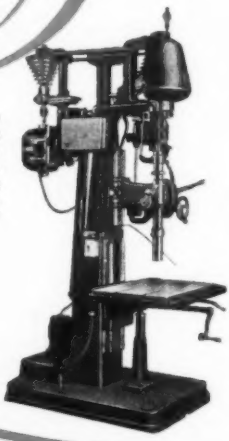
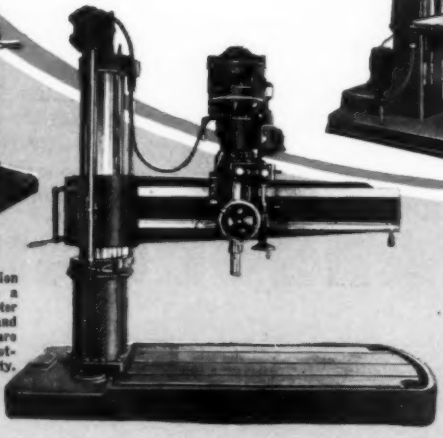
3. Showing a 21" Sliding Head Box Type Column Floor Drill . . . produced in single and multiple (2 to 6) spindle models. Built for accuyears of service. 1½" capacity.





1. A general purpose production drill . . . identified as a 21" Sliding Head Motor Driven Floor Drill . . . and available with either a square oil grooved or round T-slotted type table. 1½" capacity.

2. An 8-speed Motor Spindle Radial Drill of 1¾" capacity. Simple in design . . . yet with efficient design to assure accuracy and quality performance. New features also help to maintain popularity of this drill.

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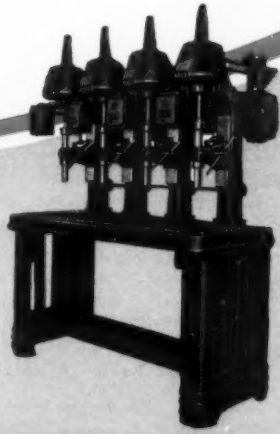

4. No. 16" — 3000BV Four Spindle Bench Drill with legs . . . which are also available with single, two, three and six spindles. These models eliminate unnecessary benches. Shelves are provided for use as tool trays.

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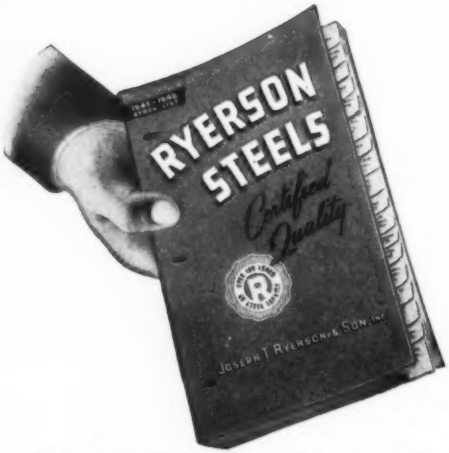

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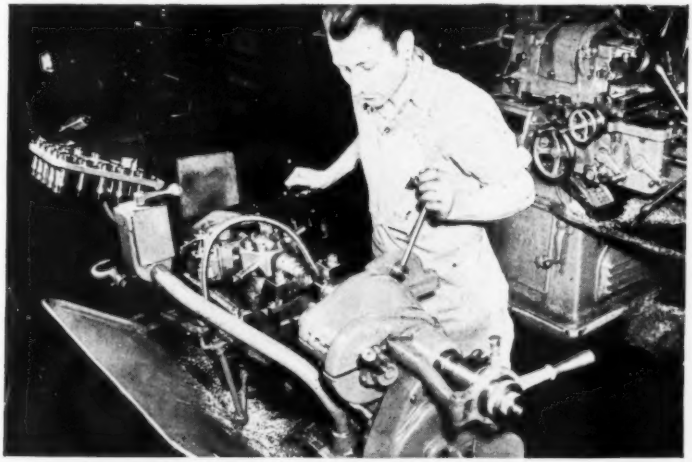
Modern Turret Lathes

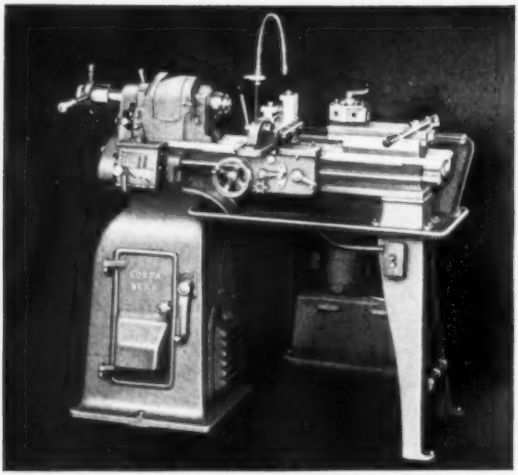
PART I — TYPES AND CLASSIFICATIONS

By JOHN E. HYLER

STRICTLY speaking, a turret lathe is a lathe with one or more turrets (usually two) for holding and advancing different tools to the cut. Relationships of certain other machines to the turret lathe are so close as to give room for argument, if one were disposed to argue. In general, as touching production and general adaptability, the turret lathe fills the need (and a wide field it is) between the engine lathe, and the automatic lathe, as it is generally considered. That is, the turret lathe makes an excellent production showing on jobs where sufficient lots are to be made that a great amount of time



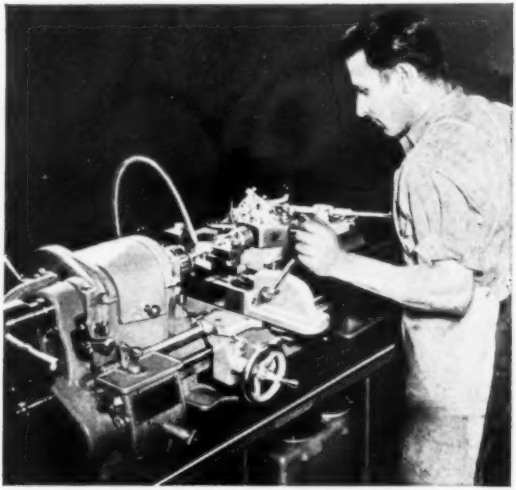
An interesting view from the back of a small turret lathe in actual operation. The machine is fitted with a hand lever operated turret and a hand lever operated cross slide. The switch shown supported in back of the machine at the left, within easy reach of the operator, provides for running the spindle forward or reverse, as well as having a center, neutral position, to enable taps and dies to be run into or onto the work, and then backed out or off.



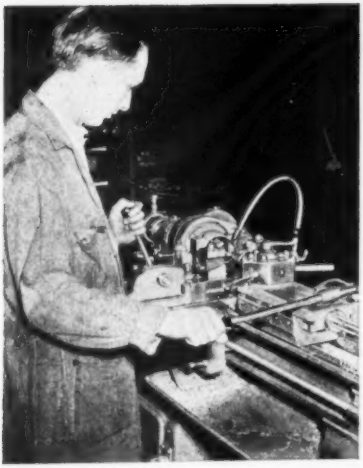
This small turret lathe has a 1⅜" hole thru spindle, and has a compound cross slide (not shown) which is interchangeable with the hand lever cross slide seen on the machine. The carriage feeds either by means of the hand wheel on the apron, or by power. The turret is hand lever operated, but is automatic indexing, and there is an individual stop for each of the six turret faces.

would be consumed in producing them on an engine lathe, and yet where such lots are not sufficiently large to justify installation and use of an automatic lathe, or where an automatic cannot be made sufficiently versatile to handle the job.

Taking this definition, if such it may be called, as a general basis, turret lathes sub-divide into horizontal and vertical lathes. Horizontal turret lathes, in turn, classify as bar machines and chucking machines. The first type feeds bar stock, after the manner of a screw



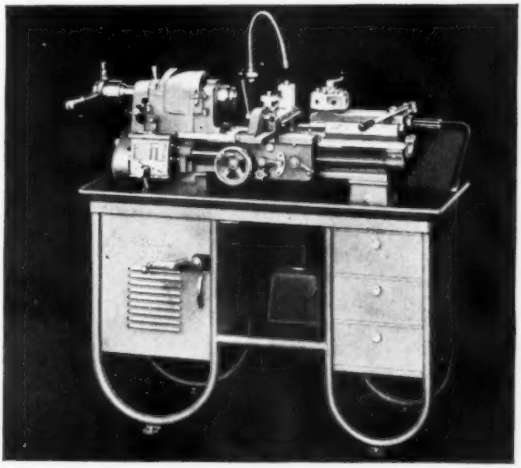
Here a small turret lathe, with a 1⅜" hole thu spindle, is shown in operation, being fitted with a hand lever operated cross slide, governed with the left hand of the operator, and with a hand lever operated turret, which is, however, automatic indexing.



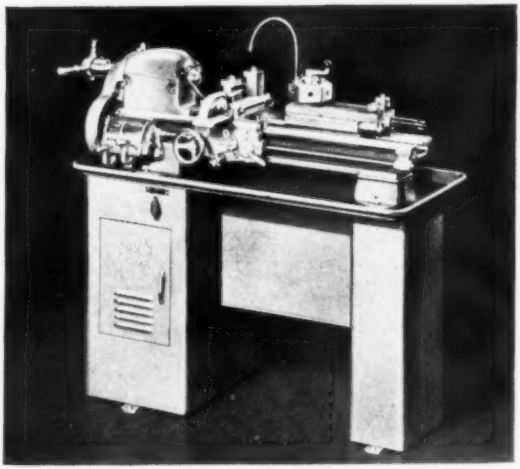
View from operator's right, showing a small turret lathe, with a 1¾" hole thru spindle, in operation, while fitted with a hand lever operated cross slide. The latter can be removed from this machine, and a compound cross slide substituted, whenever it is desired to machine bevels or short tapers with the cross slide.

machine, and cuts finished pieces from the end of the bar, as the work proceeds. In fact, small machines of this kind, on which the tool-carrying turret is advanced and retracted manually, are referred to as hand screw machines by some, while others call them turret lathes, which in reality they are. The chucking type of horizontal turret lathe, as the name indicates, chucks separate workpieces, for performing necessary operations on them.

Either the bar or the chucking type turret lathe may be made in so-called ram design, or in saddle design, depending on whether the turret is mounted on a ram, which moves back and forth in a saddle, the saddle being clamped to the machine bed, or whether the turret is mounted on a saddle directly, and that saddle reciprocated on the machine ways with the main turret. It is well recognized that both ram and saddle type turret lathes have their particular advantages. For that reason, leading builders make both kinds of machines. Again, when we consider either the ram type turret lathe or the saddle type, as apart from the other, we find other classifications among



The turret on this small turret lathe is automatic indexing, tho hand lever operated, and it may be back-indexed, or spun to skip tool positions, as the need may appear. Some like this type of floor mounting, because drawer space in the base permits handy storage of various accessories. The machine has a 1¾" hole thru spindle, a carriage that may be traversed longitudinally by power, and is provided with a compound cross slide having power cross feed, also. In the photo, however, there is mounted on the carriage a hand lever operated cross slide, which is more convenient for various types of work involving no bevels or tapers.



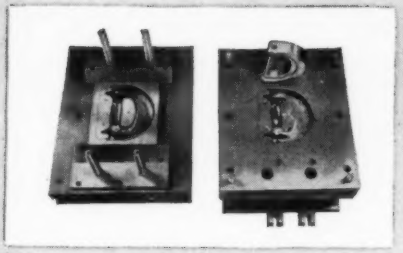
This small turret lathe is fitted with a hand lever cross slide, which carries a tool block at the front and one at the rear. This cross slide is mounted on a power feed carriage, which allows longitudinal travel of the carriage either by power or by use of handwheel on the apron, a feature rather unusual in turret lathes of this size. This machine has a ¾" hole thru spindle. There is also a compound cross slide furnished (not shown in the photo) which is interchangeable with the hand lever cross slide shown, when it is desired to machine bevels and short tapers.

them. Some saddle type machines have fixed-center main turrets, for instance, while others, designed for handling work where facing cuts are predominant, and where there is relatively little drilling, boring and kindred work, are built with cross-sliding turrets. There are several other differences in turret lathes which we shall not consider at this time.

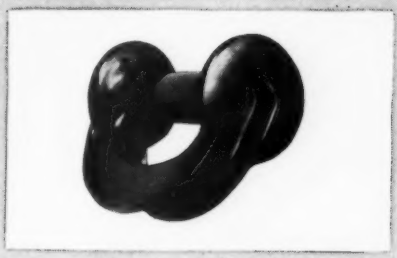
One cannot strictly classify small turret lathes as contrasted with large ones, for one man's definition or conception of "large" and "small" would differ from that of others. I must point out, however, that a great amount of work can be and is performed on turret lathes which are very small, as compared with their larger brothers. In fact, the turret lathe idea of operation has extended even further than a small turret lathe, or hand screw machine, as such. Many small shops do not have sufficient work of this kind to keep a small turret lathe or hand screw machine reasonably busy. These and other shops which have to process occasional lots of parts too small for large-sized turret lathes on the floor, use special attachments for their engine or toolroom lathes, which, in effect, convert them into small turret lathes. Some manufacturers of small lathes have developed turret attachments for their own machines, for use where desired. One of these provides a tailstock turret for six operations, and in addition, a carriage layout, providing a 4-way tool post and a back slide toolpost. Another prominent manufacturer of small engine lathes furnishes a handlever bed turret attachment, which mounts on the inside bed ways, and also a handlever cross slide attachment, fitted with front and rear tool blocks, the front block carrying two cutter bits, and the rear block one. This cross slide attachment is mounted on the saddle cross slide dovetail, in place of the compound rest assembly. Tapered wedges and thumbscrews allow precise adjustment of cutter bit height.

The practice of using tool post turrets and tail stock turrets, either separately or together, has grown to such an extent that a considerable number of firms, not lathe manufacturers, have designed and built such turrets for application to many of the smaller lathes recognized as standard, on the market.

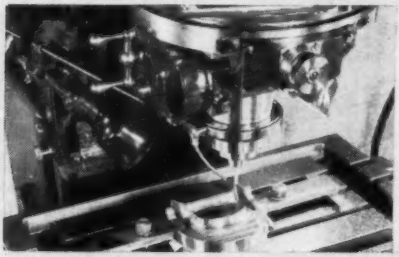
Could you machine this Mold without the Cost of Templets or Models?



This switch handle transfer mold, using SAE 3012 steel, was made from blueprint dimensions without model or templet.



Plastic switch handle as produced by the Kline Manufacturing Co., Galena, Ohio from mold illustrated opposite.



Making complete mold on a K&T Rotary Head Milling Machine assured exact production to drawing specifications — reduced total production costs.

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Many of these companies make toolpost turrets only. Others have designed and built only tailstock or bed turrets, which answer to the main turret, as found on the regular horizontal turret lathe. At least one firm makes bed turrets which are self-indexing, to fit Logan, South Bend, Atlas and similar types of bench lathes. There are also some firms, not lathe builders, which supply **both** toolpost and tailstock turrets for representative small lathes. There are differences in the construction of these various turrets and turret attachments, but all of them are designed for putting small engine lathes on a turret lathe or hand screw machine basis, as the need may appear.

Small Turret Lathes

One prominent manufacturer of pipe and bolt cutting and threading machinery furnishes a small turret lathe or hand screw machine. There are also various other builders of such machines. One of these makes a unit which provides positive lever chucking, and a self-locking main turret, as well as a ball bearing spindle. It has a six-inch capacity when fitted with a chuck, and a 1-inch collet capacity.

Another similar machine has a rod capacity of ⅝", and a six-position, automatic-indexing turret, with a stroke of 3¼". It is capable of accurate and continuous production. The manufacturer provides a special bar feed, as an accessory for this machine, when it is desired. The feed has a maximum stroke of two-inches. There is a safety cam action in connection, which both operates the feed and locks the collet.

An interesting provision found on one small turret lathe of this general type is a conveniently-located hand wheel, which may be used for advancing or retarding the spindle speed in a stepless manner, while the motor is running. This particular machine, like some of the regular screw machines, provides for reverse rotation of the spindle, as well as forward rotation, so it can be used conveniently for threading and tapping. The forward speed may be

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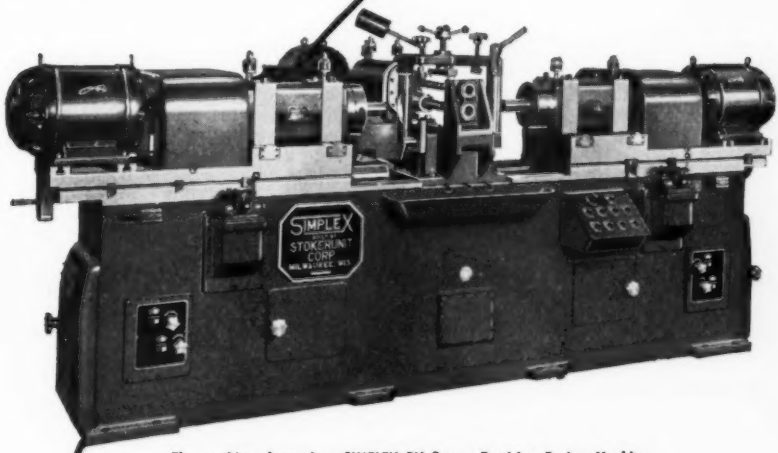

The machine shown is a SIMPLEX 2U 3-way Precision Boring Machine equipped with quick-clamping fixture for loading an opposed cylinder block and crank case while boring two cylinders, the crank shaft hole and the cam shaft hole. This insures accuracy of location and squareness of the important elements of the engine, at the same time providing a high production rate with a saving of labor and space.

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anywhere from 150 to 1050 rpm, and the arrangement is such that reverse speed is approximately twice that of any forward speed, so that a tap or die can be backed out or off of the work very quickly. There is a special clutch mechanism housed in the machine head, which operates by lever, for forward, neutral, or reverse movement of the spindle, as may be required.

One might naturally expect that leading manufacturers of screw machines, as used for small-diameter stock, would add hand screw machines or small turret lathes of bar type to their line. One such machine is provided with a one-lever spindle control, for high speed and low speed, either forward or reverse, as well as a stop and a brake. There is a trip lever for the collet, which opens and closes it by power, which also engages the stock feeding mechanism. This trip lever can be arranged to operate by movement of the cross slide. Both the cross slide and the main turret operating control have positive stops, for accurate duplication of cuts on succeeding workpieces.

Some of these small turret lathes have been given the name of "second-operation machines", in the plants where they are used, because the chief reason for their installation and use is the fast performance of further operations, on parts that have been produced from bar stock, in automatic screw machines. True, there are many attachments now in use on automatic screw machines which perform second operations, but they are indicated more for large lot production, and for other work, that cannot be handled to advantage in second-operation units. Small turret lathes, which are much used for this duty, have been put into use in an increasing number of shops recently.

A fairly common error in production departments in the past has been that of purchasing relatively large and expensive turret lathes, capable of many operations, and then confining them

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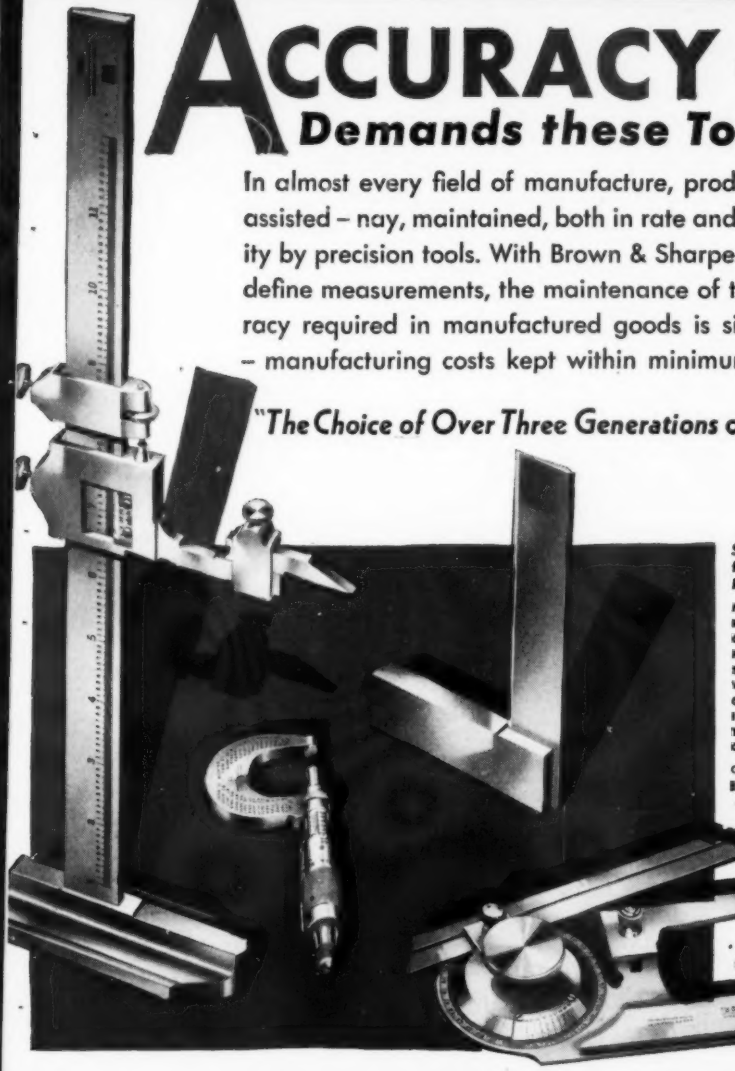

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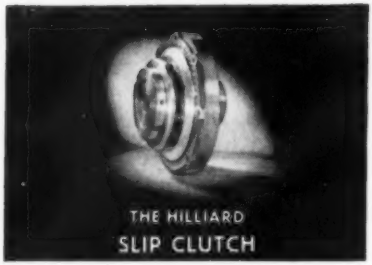

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almost altogether to second-operation duty. One line of small units now being extensively used in such work is provided with double-tool cross slides, and with six-position, tilted bed turrets, which take standard tooling. The six-position turret has an automatic indexing and locking head, with six independent travel stops. The collet capacity of these machines is one-inch, but they have a jaw chuck capacity of five-inches.

It is interesting to observe that some of these latter small turret lathes, (in which the work-holding collet is usually operated by means of a lever) have been much speeded in their operation in certain cases, by equipping them with special air cylinders for operating the collet chuck levers. Some companies which specialize in air cylinder manufacture provide units especially suited for this purpose. The air cylinders can be mounted on brackets, attached to the lathe beds at any convenient points, and connected with the collet chuck levers by means of suitable linkage.

A very interesting line of small turret lathes is built by some of the leading manufacturers of small engine and bench lathes. These machines, being of small size, may be obtained with different types of floor mountings. This provides a considerable choice of machine styles for the purchaser of small turret lathes. They have hand lever operated cross slides, with front and rear tool blocks, for turning, forming, facing and cutting-off operations. The turrets are also hand lever operated, are automatically indexed, and provided with individual stops for each of the six turret faces, allowing quick and easy duplication of cuts on succeeding workpieces.

(To be continued)

(Illustrations—Courtesy South Bend Lathe Works, South Bend, Ind.)

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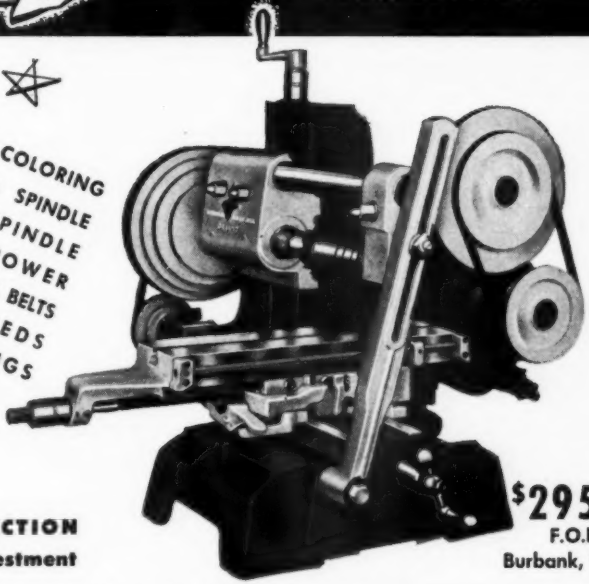

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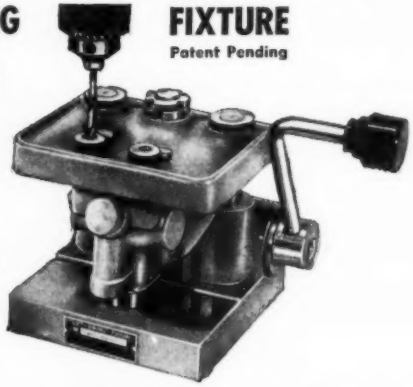

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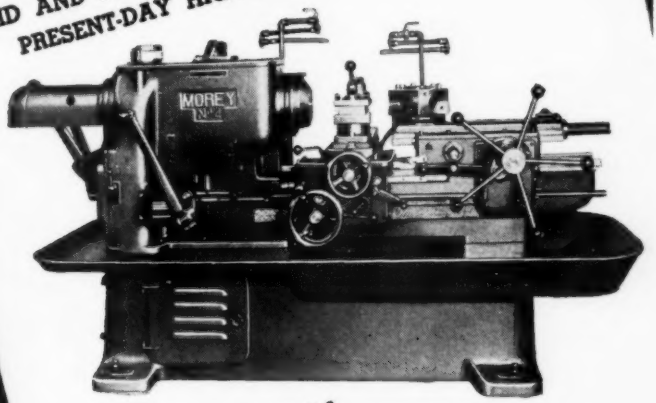

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Versatility of The Ball

PART IV — MISCELLANEOUS APPLICATIONS

By H. F. WILLIAMS

IN many types of machinery, dovetail and square guides are used for various slide mechanisms. These are very satisfactory where the elimination of friction is not of paramount importance. In Fig. 131 the idea of a slide is shown which moves on a series of balls at either side. A thin strip of plastic is drilled to receive the balls. The center portion of the assembly represents the slide. Two 90° included angular grooves, ground to a good finish, run along the sides of the slide. Similarly, the two outer pieces contain a like groove in each piece. It is not necessary to hold the dimension of the slide width to exact measurements if one of the side guides is made like a tapered gib. This tapered guide is adjusted from the end and assures proper contact of the balls and slide. If it is necessary to keep the slide centrally located, then both side guides may be tapered on the surface opposite the vee-groove. The groove face should have a surface hardness approximately equal to that of the balls, i.e., usually from 64 to 66 Rockwell C scale.

While the slide arrangement in Fig. 131 is adaptable for light type work, ball guides illustrated in Figs. 132 and 133 can be used for heavier work. They take the place of the usual vee and flat guides respectively The general design in Fig. 132 is the same as in Fig. 131 except that the upper and lower guides are fastened to the stationary and sliding members in a suitable manner. There is a four point contact for each ball, as both grooves are 90° included. In Fig. 133, the lower guide is the same as in Fig. 132 but the upper guide has a flat surface. In both instances the balls are separated by suitable retainers. Provision must be made for proper lubrication and the guides should be shrouded on the sides to prevent entrance of dust, water or harmful abrasive material.

Because music wire possesses a high hardness value, it is used in the races of the design shown in Fig. 134. The idea is adaptable to both straight guide work as well as cylindrical. The corners of the grooves are machined to a radius equal to the wire used. These grooves can be shallow as shown and when used as a cylindrical bearing, it is obvious that considerable space is saved over the conventional thickness

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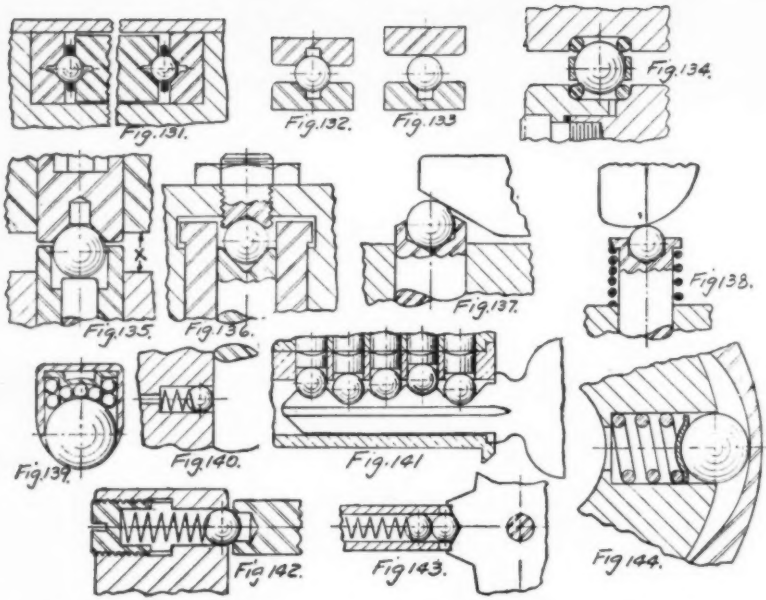
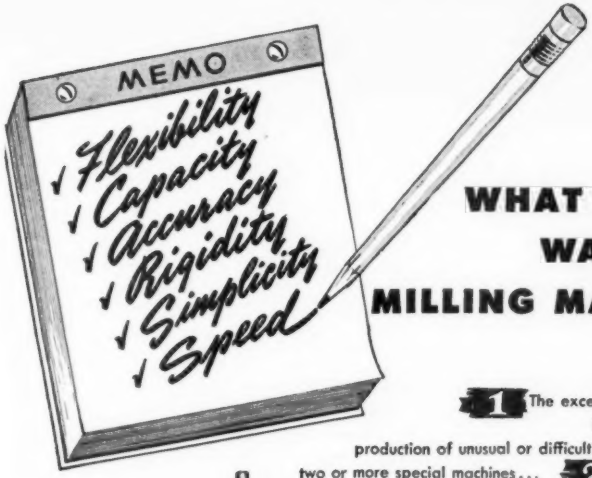


of inner and outer races. The lower member is shown as being adjustable with a shim. When adjustment takes place, the two bottom wires are forced closer together thereby forcing the ball upwards. Proper four-point contact can thus be maintained.

In Fig. 135, a hardened steel ball resting on the hardened ground and lapped end of a tool steel rod, is used in a balancing fixture. The rod is pressed into an elevating spindle operated by an eccentric. The work to be balanced is placed over the pin contacting the ball. This pin has a 90° included angle countersunk hole, lapped to a good surface. The ball therefore has a ring and point contact. The arrangement is shown in the operating or balancing position. When not in operation, the center spindle in the bottom member is lowered by the eccentric, the surfaces x contacting one another, while the ball drops away from the countersunk bearing in the pin above. The end of the upper pin is relieved to enter the hole in the lower member.

In a similar design, the method shown in Fig. 136 is, however, adapted to a heavy indexing device. Because of the considerable amount of friction, the table required too much power to move. The central piece is lapped to 90° included angle. The end of the screw above is lapped to 120° included angle, not so much for accuracy as for smoothness of contact. During operation, the center rod is raised, lifting the upper member connected to the table. The table thereby leaves its seat a slight amount and can be indexed readily to its next position when it is then lowered to the locking position. The upper member thru which the screw passes actually consists of two pieces fastened together. The flange on the lower sleeve limits the upward movement of the table from its bearing.



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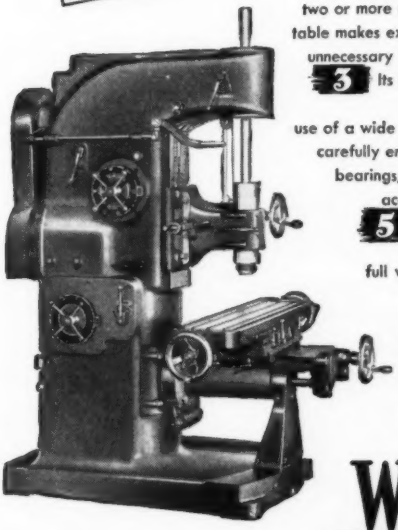

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When certain types of mechanisms are operated by tripping dogs such as an hydraulic valve, dog tooth clutches, gears and the like, the design for the top of the plunger as shown in Fig. 137 can be used. In place of an angular end or one in which a roller pivots, the use of a comparatively large ball makes operation relatively easy. The plunger-end is conical to clear the beveled end of the operating dog which is shown above the ball. The end is also drilled out slightly deeper than half the diameter of the ball. With the ball in place the edge of the opening is slightly peened or rolled over so that the ball is free to rotate yet will not come out. As the dog pushes the plunger downward, the ball will rotate, acting the same as a pivoted roller.

In Fig. 138 a similar assembly is shown. Whereas the plunger in Fig. 137 is usually raised by the action of another plunger and dog, the latter operating in the reverse direction of the one shown, this design has a compression spring returning the plunger to the upper operating position. The top of the plunger, flanged for spring retention, has a ball socket made in the same manner as in Fig. 137, in that the ball is fitted rotatively in the hole.

A ball bearing caster which is almost frictionless in action is illustrated in Fig. 139. The shell accommodates a washer having a concave spherical surface to accommodate a series of small balls against which the large ball rolls. The shell wall is tapered at the end so that when rolled over the ball it forms a tangent joint as shown. If the assembly is inverted and suitably held, it may be used as a roller upon which to move heavy objects. It can be used in multiplicity for large work.

For the lubrication of vertical shafts, there is usually a waste of oil when an oil groove is provided in the holes. In Fig. 140, the oil hole is drilled out from the opposite side of the shaft hole (not shown) and thereafter plugged. Into the enlarged hole, reamed to close tolerances, a spring and ball are placed. The ball has a close running fit and

***FLEXY**—the S.S.White Flexible Shaft Man—says . . .*

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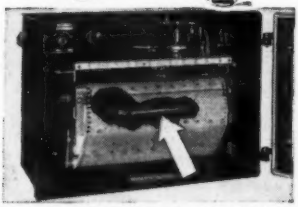
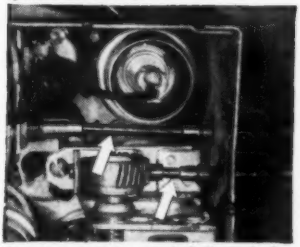


Coupling driving to driven mechanisms with S.S.White flexible shafting — as in this recording instrument — provides a smooth-running, vibration-proof drive and makes accurate alignment of connected spindles unnecessary.



Coupling external control shafts to tuning elements—as in this radio receiver—damps noise-causing vibration, eliminates need for precise mounting and alignment of tuning elements—also gives complete freedom in their location.

IN all power drive and control applications within the wide range of flexible shafts, you can readily eliminate misalignment as a factor.

For example, take a small power drive — like the one in the top illustration at the left. By using an S.S.White flexible shaft as a connecting link between driving and driven members you eliminate the need for accurate alignment — and with it the expensive close-tolerance workmanship and assembly needed to obtain accurate alignment. And you eliminate the vibration and uneven operation that any misalignment in a solid shaft drive would cause.

For coupling elements requiring operational adjustments — as in the lower example — S.S.White flexible shafts offer the same advantages.

This is only one of the many ways in which S.S.White shafts can serve and save. To get the complete story —

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For All Metal Cutting Jobs

STANDARD TOOLS OF ALL GRADES...General Purpose, Cast Alloy, and Tungsten Carbide. Three of a kind when it comes to quality, a Delloy tool, bit or tip will do the job better and faster. Delloy tools hold their edges longer, thereby increasing the number of pieces produced by cutting the down-time. Prove it today by sending for samples of the size and type of cutting tool you are now using. Our complete grinding department assures quick delivery on special tools. Standard tools stocked for immediate delivery.

Delloy
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CUTTING TOOLS

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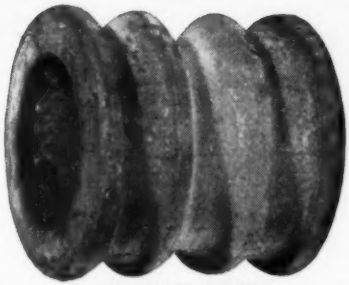
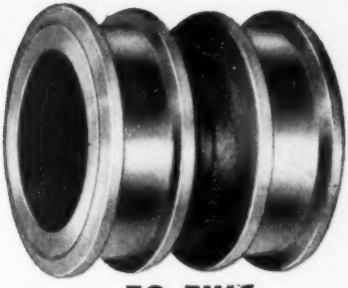
acts as a dam for the oil. As the shaft rotates, oscillates or reciprocates, the ball rolls against the shaft, depositing a limited amount of oil on the shaft and journal surfaces. The spring is sufficiently weak so that rolling action of the ball is not retarded, but strong enough to maintain a contact between ball and shaft. If a sight feed oiler is used, the oil supply may be observed which will be found to last over a considerable period of time.

In a well-known door cylinder lock of the pin tumbler type, five small balls are used under the tumbler pins and against which the key contacts. This is shown in Fig. 141. The key plug in which the key shown, is drilled with five uniformly deep holes onto which the balls and pins are placed. In the cylinder shown in section above the key plug are five similar holes which accommodate another set of pins backed up by small compression springs. Before the key is inserted the springs push the two sets of pins and the five balls downwards so that the balls rest at the bottoms of the holes in the key plug. The upper set of pins then act like five small bolts locking the cylinder and key plug together. The lever that operates the lock bolt is fastened to the end of the key plug. When the key is inserted into the special broached slot, the end of the key, milled off at an angle, cams the balls upward, thereby forcing both sets of pins to compress the springs. The two sets of pins then part at the periphery of the key plug and allow the key to turn the plug in the cylinder. The lever at the end of the key plug then operates the bolt, opening the door.

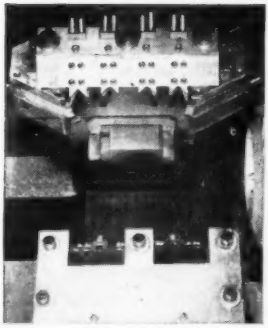
Thus far, only the service key action has been explained. Where many locks are used, each having their own individual keys, a master key can be supplied which operates all the locks of one particular series or group of locks. This is made possible by the use of an additional cylinder in which the key plug turns. By the addition of this extra cylinder, another set of five pins is added making a total of 15 pins. Each





FROM THIS . . . . . TO THIS

IN 4 MINUTES (Floor to Floor Time)

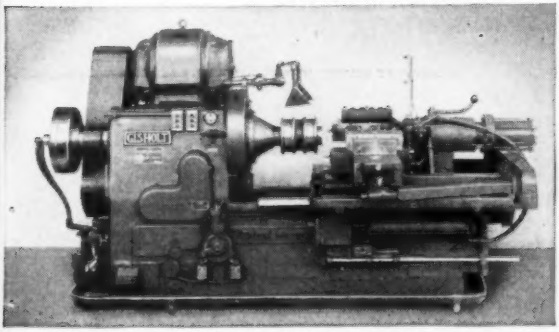


Here's another good example of the way a large number of surfaces can be machined at one time. Gisholt's versatile design permits many variations with two or more heavy duty slides, each with its own drive, its own rate and direction of feed. Yet, all are driven from and accurately timed with the spindle.

These track rollers are machined with 24 carbide tipped tools on 3 slides. Actual cutting time is 2½ minutes using over 40 H.P. Loading, unloading, etc., require 1½ minutes. Total time, floor to floor: 4 minutes.

THE GISHOLT SIMPLIMATIC

The machine shown here is equipped with an expanding arbor operated by a 16" air cylinder; has a tailstock and three tool slides. It is tooled to machine two sizes of two different types of track rollers. All machine functions are automatic, operated by a single control. An operator can normally tend several Simplimatics. If large volume, low cost machining interests you, write for information about Gisholt Automatic Lathes.



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Increases cutting speed of grinder wheels; decreases cost of maintenance of the dresser . . . that's what YELLOW HEAD "Self-Lubricating" Dressers will do for you. Dry, greaseless graphite is sucked from the large magazine in a thin film, providing constant lubrication for all moving parts. As shown above: A—Magazine for dry graphite; B—Ducts to bearings; C—Spindle bearings; D—Safety hood. Sturdily constructed, economical to operate. There's a plain type "Yellow Head" and full line of cutting heads.

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Piqua, Ohio

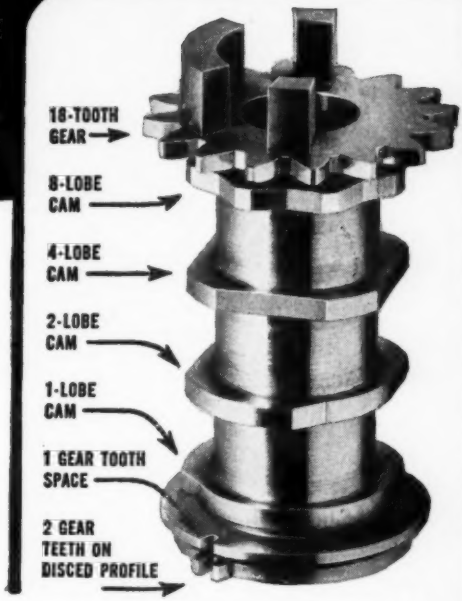
service key unlocks the door as explained, but the one master key unlocks all the doors in that the upper two sets of five pins each (not shown) part at the periphery of the master cylinder and not at the periphery of the key plug. Because the variation of one thousandth of an inch in the length of one pin makes the lock inoperative, it can be seen that there are an unlimited number of key changes possible.

In a simple indexing fixture where a bolt is not necessary for locating the plate angularly, the design shown in Fig. 142 has merit. The boss on the fixture body is drilled, reamed and tapped for a ball, compression spring and headless screw. Space is saved by drilling out the end of screw to seat the spring. The index plate is merely drilled at its outer surface into the holes of which the ball is forced. The only retention the ball and spring have is the index plate so that during disassembly, care must be taken so they will not "shoot." The screw adjusts the spring pressure against the ball and may be locked in place with a lock nut if a longer screw is used.

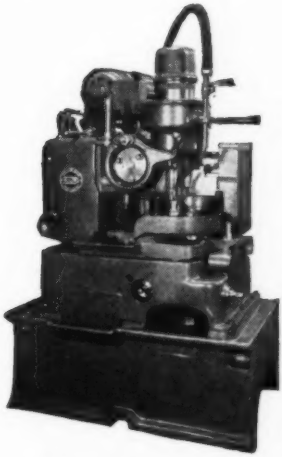
In Fig. 143 another indexing design is illustrated. A star wheel or wheel segment is positioned by two balls which are backed by a spring. To avoid any retardation of rolling because of a spring contact with the ball, a second ball is used for positioning the star wheel. In this instance, the tube housing the balls and spring, must be slotted at the end so that the star wheel may pass. This wheel is thinner than the diameter of the ball. If a thicker wheel is used, greater than the ball size, these balls must be replaced by a spherical-ended pin for proper contact in the hole.

A hardened and polished steel ball acts in two capacities in the hydraulic pump arrangement shown in Fig. 144. Contacting the stationary cam surface, it takes the place of a roller and being a snug fit in the hole of the radial cylinder it becomes a piston. The return spring rests against a cup with a spherical concave surface in which the ball fits.

1-Piece Machining for Multiple Cam and Gear Part



. . . . . with 0.001" relative alignment and concentricity



7A-type Fellows Gear Shaper

In the machining of the cams and gears on the part illustrated, Fellows Cutters provide the necessary accuracy of shape and alignment. Such an example demonstrates the versatility of the Gear Shaper. For complete details on the countless advantages and economies which result through the use of the versatile Gear Shaper, write for your complimentary copy of "The Art of Generating with a Reciprocating Tool".

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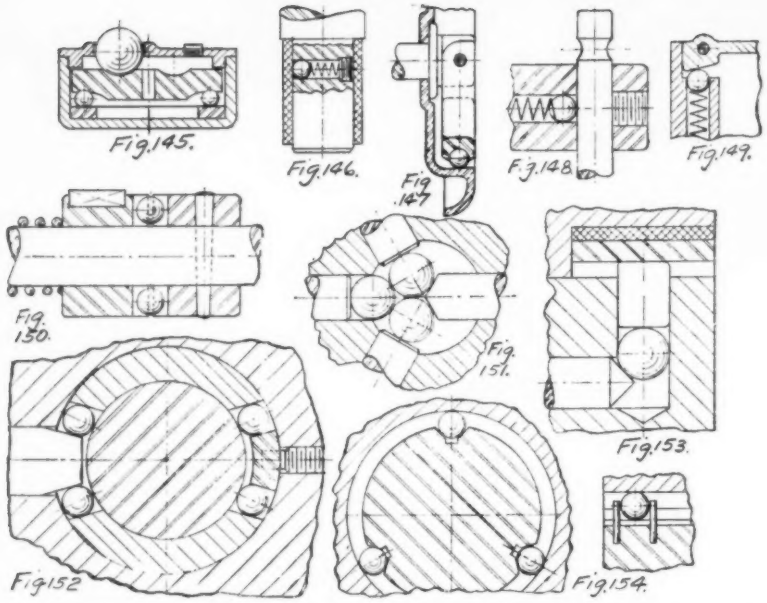

A special type of bearing, Fig. 145 known as the Hoffmann sun and planet friction eliminator makes use of a large ball running in a freely rotating raceway. It is used with sliding and reciprocating mechanisms. At the bottom of the housing is a fixed raceway in which run a series of balls in a separator to form a thrust bearing. The plate above the balls has a circular raceway ground in its upper surface in which the work contact or load ball runs. This large single ball is retained by a suitable hole in the cover which can be locked in place. When a load imposed works perpendicular to the thrust load at the point of contact with the large ball, the ball rolls on the endless circular track without frictional contact with the cover, thereby making practically a frictionless load carrier.

When assembling "Compo" bushings on a production basis, Boundbrook Oilless Bearing Co., recommend an arrangement as shown in Fig. 146. The hole into which this oil-retaining porous bronze bearing is to be pressed is slightly chamfered to start the bushing. The inserting plug, held in a press, has a spring-backed ball which exerts enough pressure in the bore to keep it on the plug before insertion. This plug of hardened steel is ground .0002" greater than the minimum bore diameter desired after installation. By this method the mirror-like bearing surface does not have to be reamed.

A ball is used as an anti-vibration feature on a Corbin cup and drop handle in Fig. 147, used to operate a two point latch. The handle in which the ball is pressed has two circular prongs to accommodate two fingers. When pulled out perpendicular to the position shown, it acts as a lever to turn the bronze cam which in turn actuates the two lock bolts (not shown). As the drop handle is pushed downwards it

These connecting rods for home refrigerators each have two holes that are ground on Bryant Grinders to close tolerances and fine finish.

Specialists in Forged Steel Jewelry

No, we don't sell it; we don't make it, but we do build internal grinding machines that make it. The three connecting rods for home refrigerators, shown above, are typical examples of the type of work that is ground on Bryant Internal Grinders. They are truly jewel-like in their finish, but that is not enough—to be sure, Bryant Grinders produce metal parts that have surfaces finished correctly to millionths of an inch, when desired, but Bryant machines also produce these same parts with holes that are truly round and straight. These are basic elements that Bryant insists upon to assure Bryant users that their parts and products will last for years without mechanical failure.

WE KNOW YOUR PROBLEM IS DIFFERENT . . .

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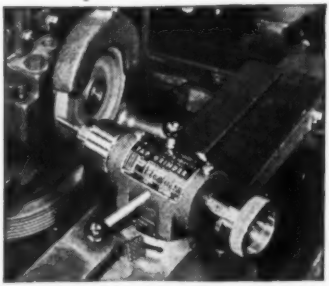

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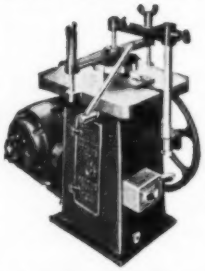


READING MACHINE CO.

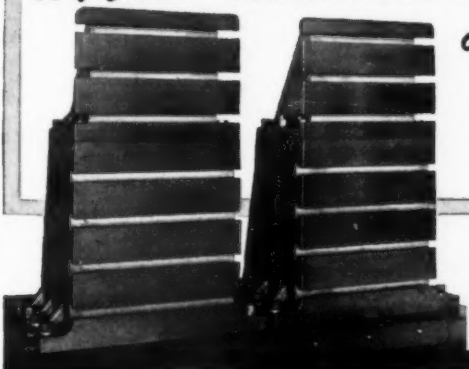
READING (CINCINNATI) OHIO

nests into the bronze cup, the ball meanwhile riding along a slight incline to a locking position. The cup and handle in the down position are flush. The bolts operate on a 90° angle turn of the drophandle.

An adjustable lever handle is illustrated in Fig. 148. It is adaptable to a bench vise, to the feeding mechanism of a drilling machine or any other place where leverage must be changed instantly. The screw head or pinion end is drilled out for a ball and compression spring. The rod is then inserted. Two methods of holding are shown. If the spring is made strong enough, sufficient pressure can be exerted against the ball and consequently the rod, to hold the lever in any position and at any length of leverage. If a weaker spring is used, then the tapped hole opposite the ball is used for a thumb or other quick acting screw. The lever rod is grooved at either end as shown so that if it is extended too far, the ball falls into the slot. An additional pull is necessary to remove the rod so that the groove acts as a warning that the lever is separating at its maximum capacity. Sometimes the rod ends are hemispherically shaped to facilitate assembling past the ball. This is only necessary if the spring is of considerable stiffness.

To hold a hinged cover open at 90°, the method shown in Fig. 149 is neat and effective. It operates on the jackknife blade principle. As the cover is opened, the ball is cammed downwards until the cover is nearly opened 90°. After the ball rides over the rounded corner, it is urged upwards by the spring, snapping the cover backwards against the stop to the left of the rounded boss for the hinge pin. Because the center line of the ball and spring are behind the pivot pin, the forces act to keep the cover either open or closed. The assembly can therefore be used in a position perpendicular to that shown. The design is adaptable to comparatively light work altho heavier covers can be operated if a huskier spring is used.

A *New* HIGH IN A COMBINATION of MATCHED *Angle* BLOCKS!



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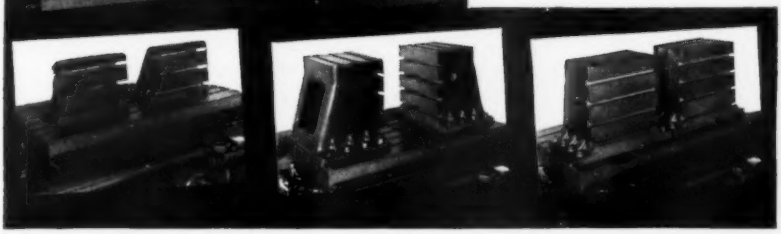
TEE SLOTS—13/16" Wide, 4" Centers.



THIS combination of matched units serves convenience and rigidity for accurately locating and chucking work when boring, milling, planing or for other toolroom and general use. They can be used singly or in variety of combinations for large or small work.

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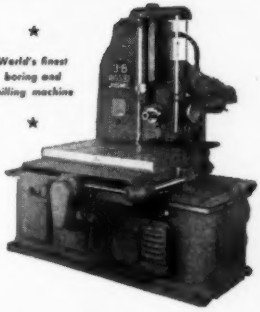

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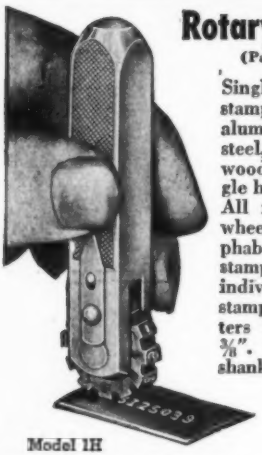
NUMBERALL



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An overload ball clutch for a machine feed screw is shown in Fig. 150. One stationary and one slidable sleeve are milled at the end with 90° included angular teeth into which the balls fit. The sleeve at the left slides into a flange fastened to the feed screw. The sleeve at the right is pinned to the handwheel shaft. The balls act as the driving medium. When the screw is overloaded, the spring collapses, allowing the sleeves to separate. The assembly is of course housed (not shown) so the balls ride only longitudinally and will not fall out. The spring is also arranged to be adjustable so that varying overloads can be accommodated. The serrations at the ends of the sleeves and the balls are hardened to about Rockwell 65 C scale.

A three-point clamp actuating mechanism in which steel balls play an important part is shown in Fig. 151. Three rods are placed 120° apart on the circle. The fourth rod, on the centerline, is operated manually by lever or automatically by cam, in either event having a return spring to relieve the clamping pressure. As the ball on the left is forced against the other two, equal pressure, is exerted against the ends of all three clamp rods. The center ball actually parts the other two touching balls and reaction against the 30° angular surfaces of the one rod, forces the other two flat ended rods outwards uniformly.

Braking assemblies can also be operated by ball devices, especially where such brakes must be actuated remotely. In Fig. 152 the idea illustrated makes use of four steel balls. The two brake shoes, shown plain and without brake lining, are flanked by a ball at each end. A stationary shoe, against which two balls bear, is shown at the right. An expanding bolt at the left forces the bands to their gripping position thru reaction against the stationary piece at the right. After wear takes place, this stationary shoe can be adjusted inwards to take up slack. The bolt, balls and adjustable shoe are all of hardened steel. Brake bands of cast iron, bronze, steel and brake lined metal

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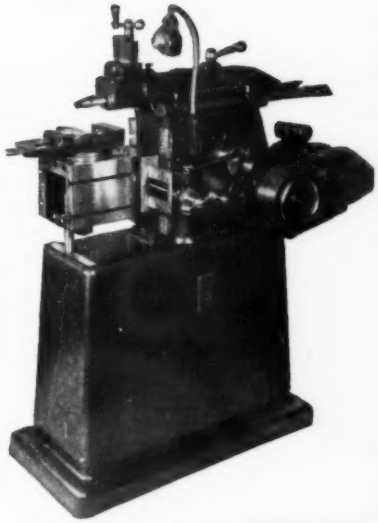

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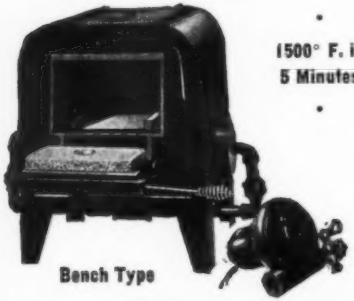

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can be used with effectiveness. The whole assembly is used merely as a locking mechanism and not as a means to bring to a stop a rotating member.

Another braking device is shown in Fig. 153. In this design it is operated from the center. The central actuating pin is conically pointed to about 90° included angle. While the assembly shows only a single shoe, arrangements can be made for two or three in 360°. Each shoe has one ball and one pin as shown, the balls being spaced 180° or 120° around the central actuating pin. This design is also adaptable to use as a clutch.

When a fairly heavy central member of cylindrical shape must be moved axially with a minimum of effort, or where friction retards ease of sensitive movement, the assembly shown in Fig. 154 or one similar, can be used. Slow rotary and oscillating movements can also be made. The balls ride in 90° vee-grooves in the central part and are retained as shown in the auxiliary view by the use of small pins. These single or multiple pin separators are placed at either end of the piece to be moved, the number of balls in each groove depending on the load or weight of the slidable member.

It is sometimes necessary to operate a unit of a mechanism remotely from a given position, especially around corners where a push and spring return movement is required. The method in Fig. 155 is not new but it has possibilities for heavier work than can be accomplished with wire. The balls should fit the inside of the tube with a good sliding or rolling fit. If the bore is much larger than the diameter of the balls, there will be too much slack to take up. Spring return at one end is necessary only where the assembly cannot be operated from both ends.

For infinitely variable speeds within a given range and for work requiring low power characteristics, a drive as illustrated diagrammatically in Fig. 156 will be found useful. Either of the rolls

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In flexible shafts the wire core wears out first. Exclusive with WYCO Flexible Shafts is this Patented Non-Metallic Innerliner that makes the core last far longer; run more smoothly; transmit more power.

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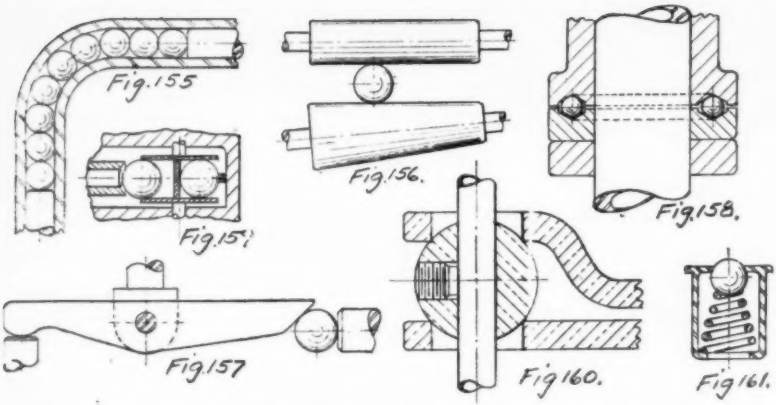
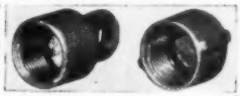


may be the driver. The ball must be suitably caged in a sliding mechanism and sufficient friction between the ball and rollers should be provided adjustably. In the assembly shown, both rolls rotate in the same direction. If they must rotate in opposite directions, two balls contacting one another held in a central shifting housing are used. The surface of the rolls must be of about the same hardness as the ball. This ball intermediate takes up less room and operates more freely than a convex shaped roller. With proper tension, there is little or no slippage. Therefore in the case of small, light loads, a high degree of efficiency is attained.

A remote clamping arrangement making use of a steel ball is shown in Fig. 157. It can be used in two ways, the fulcrum being either in the center or at the pin at the left. The pin at the right pushes the ball against the angular surface of the lever and is operated either by hand with a cam or by power.

When a heavy column or other form of upright must be accurately and easily positioned with as little friction as possible, the design shown in Fig. 158 can be used. An insert of hardened steel is ground as illustrated and fastened to the lower part of the column. A ring with a similar groove acts as the lower bearing. The grooves are filled with balls, a retainer or separater being unnecessary. The flanges are shrouded to eliminate the entrance of dirt and proper facilities are provided for lubrication. Because movement is confined to 360° or less, this non-rotat-

The **PRUTTON** *Tapmaster* • • •



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ing assembly can be packed with grease thereby necessitating but infrequent replenishment of lubricant.

An interesting use of two hardened steel balls in the Rawl-plug Electric Hammer is illustrated in Fig. 159, in that the balls are thrown by centrifugal force against the end of the drill holder. Altho not shown, the ball rotor, mounted on ball bearings, is driven at high speed by two vee belts from a universal motor in the body of the hammer. As the rotor containing the two balls rotates, one ball is flung against the central pin at the left side while the other ball at the right is guided by a cam at the right. The cam prevents centrifugal force from acting on the ball in this position. This action delivers 3000 blows per minute to the end of the tool holder. In the idling position, the sleeve above the tool holder, being spring backed, cushions the blows of the balls. At this time the balls do not strike the tool holder. Only when pressure is brought to bear against the end of the hammer or other tool mounted in the tool holder, does the described action take place. The balls and cam are of the highest hardness attainable. The mechanism is patented.

In Fig. 160 a brass ball is used to pivot an adjustable coolant supply line. The ball is drilled for the tube in the center, the latter being held by a headless dog point set screw. The two flanges, slightly larger than the diameter of the ball are drilled to have contact at about 45° with the axis of the ball. Further to the right (not shown) is a suitable clamping and attaching screw. This screw places sufficient tension of the two flanges so that the ball can be positioned under friction.

In a flush type oiler, Fig. 161, which is used where space is at a premium, a ball is used as a valve or cover to keep out dirt. The oil can spout forces the ball downward on the conically wound compression spring.

The sliding gear positioner in Fig. 162 is unique in that one spring with a ball at each end, is used. A double

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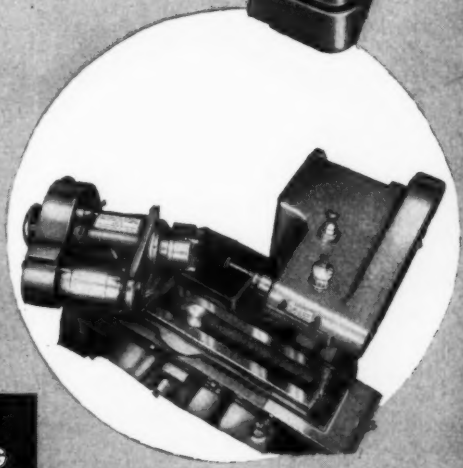

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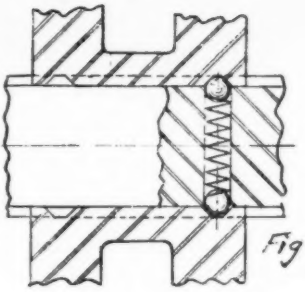

Fig 162

gear, operated by a shifting fork, slides along a splined shaft mounted on tapered roller bearings. The hole for the balls and spring is drilled thru the shaft at the bottom of the splines. The positioning grooves are machined in the gear bore at a 90° included angle, the depth of which does not exceed the depth of the spline. A slight urge is required at the hand lever of the shifting fork to cam the balls out of the groove. The balls then ride along the spline in the gear until they register with the groove at the other end where the spring forces them outwards into engagement.

In the remaining examples in which the ball plays an important part, sketches do not accompany the text. Most of these designs have been recently announced and most likely will be recognized by the reader. The Saginaw Steering Gear Division of General Motors have announced a ball bearing screw and nut applicable to many industrial uses. The principle was successfully adapted some time ago to the steering mechanism of passenger cars, buses and trucks. The screw and nut are machined with helical ball races or hemispherically shaped thread grooves between which the balls roll. Registering with the grooves in the nut and mounted on the outside of the nut is one or more tubular ball return circuits. When torque is applied to either the screw or the nut, the balls function with a rolling engagement between the two members. Because of the tubular

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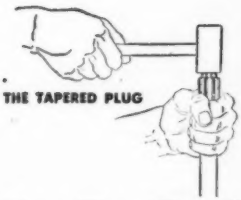

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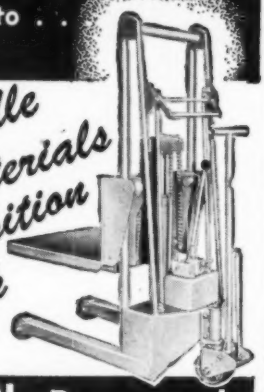

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return circuit system, an enclosed passageway results, thru which an endless row of balls passes. In a comparative test with a conventional acme threaded screw and nut it was found that the effort required to lift a given weight was 40 foot pounds with the ball type screw and nut whereas it took 180 foot pounds of effort with the use of an Acme threaded screw and nut. It is claimed that efficiencies of 90 percent or greater are attainable and are not dependent on large helix angles. The size of balls used depends upon the load and range from 1/16 to ¾" in diameter. Because of its smooth and effortless action in which a rolling motion replaces a sliding motion, it is recommended for machine tool lead screws, lift trucks and overhead conveyors. Its other uses pertain to the aeronautical and automotive industries.

Another interesting and unusual use of steel balls is in the Chiksan ball bearing swing joint for pipe line assemblies. These swing or swivel joints available in straight, elbow, U-turn and S shapes are used for low and high pressures and high temperatures. They are comprised of rotating members locked together with a double row of balls whose function it is to maintain pre-regulated load on the packing element as well as to carry radial load to hold the joint in alignment under all conditions.

A new type of ball reciprocating bearing was recently presented to the trade by the Bantam Bearings Division of the Torrington Co. It consists of helical spring, the wire of which is drawn to a special hour-glass shape. Between the coils of this spring steel balls are placed one touching the other, the wire holding the rows of balls apart. The unit thereby is a helical separator filled with balls. Previously a bronze, steel or aluminum cylindrical sleeve was drilled to form pockets for ball retention. Because of the metal required between holes, less balls per 360° of helix could be used. In the new bearing the hardened shaft or spindle rides in a long helix of balls. A hardened and ground sleeve forms the outer race of

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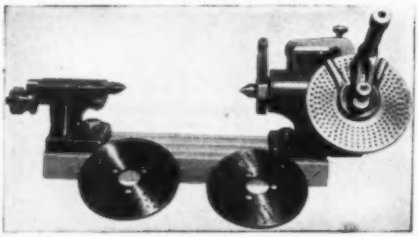
THE BRIDGEPORT MACHINES, INC., *Bridgeport, Conn.*

the assembly and is pressed into the shaft housing. The bearing is capable of both rotation and axial reciprocation.

A new reciprocating bearing known as the "ball bushing" has been announced by Thomson Industries Inc. and is applicable to shafts and sliding members of round, square, rectangular, hexagonal and octagonal sections. In the bushing is a series of endless ball circuits. On one side of each circuit, the balls sustain the load while on the other side of the circuit the balls are returned in a clearance slot in the outer member of the bushing. Therefore in an assembly having six ball circuits, load is sustained at 60° spacing about the periphery with six return grooves in the whole of the outer member. The balls are not separated and with the exception of the half-circle turns at the ends of the circuits, there are as many loaded balls as in the return half of each circuit. Because the bearing balls remain centered under load, it is said that binding and cocking on the shaft cannot occur. Sealed-in lubrication is provided and with the rolling contact the balls give, long life of anti-friction alignment is thereby assured.

There has recently appeared a new type of bearing known as the Unibal Spherical Bearing which makes use of one large ball with a hole thru it. This ball is assembled within an outer case together with two bronze bearing rings in which the ball rotates. These rings are expanded over the ball into locking recesses in the bore of the outer ring. The ball, having a large contact area is capable of taking up misalignment in all directions. It is made of SAE 52100 chromium steel, heat treated and finished to a high polish. The assembly is used as a machine bearing or as a rod-end arrangement. It is available from Heim Co., in bores of 1/8" to 2½" with outside diameters of 9/16" to 4½" and with 3/16" to 2" race widths.

To summarize briefly, in this series of articles on the use of the ball, many applications have been presented. Thruout all the installments, it has been my thought to cover as many various types of applications as possible, most of which had different approaches. It is realized that there are numerous other designs in which the function of the ball is important, but the drawings accompanying the texts have been representative of many mechanisms. These have included: — Pivot bearings, end thrust, hinges, centers, screws, pin and rivet locks, shoes, locks for tool shanks, jacks, detent and interlocking devices, indexing and locators, chucks, centering arrangements, safety couplings, drivers, over-running clutches, safety gears, ratchets, forming tools, hole sizing and ball broaching, knobs and handles, vises, clamps and jigs, equalizing plungers, valves, measuring tools, gauges, floating reamers, brakes, guides, locks, rollers and casters, hammers, drives, lubricators and swivels. In all these applications, materials of which the ball is made have included high alloy, carbon and stainless steel, brass and bronze, monel metal, plastic, aluminum, hard rubber, tungsten carbide and glass. It can be truly said of these specimens of mechanical perfection, they are the "Jewels of Industry."



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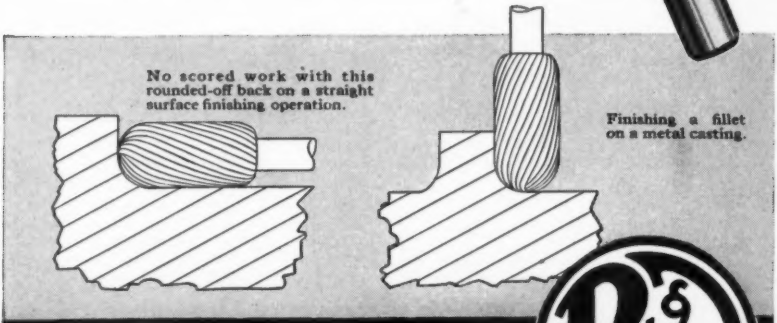

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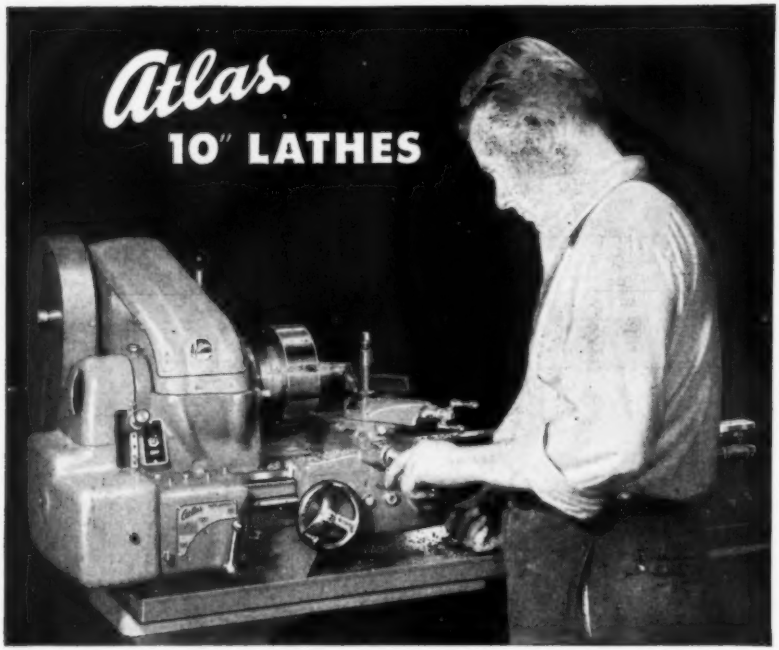

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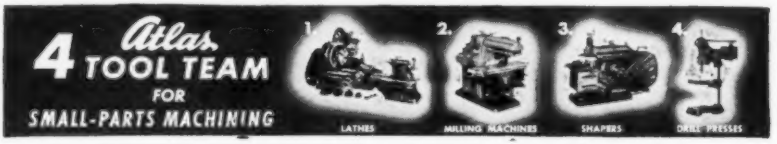

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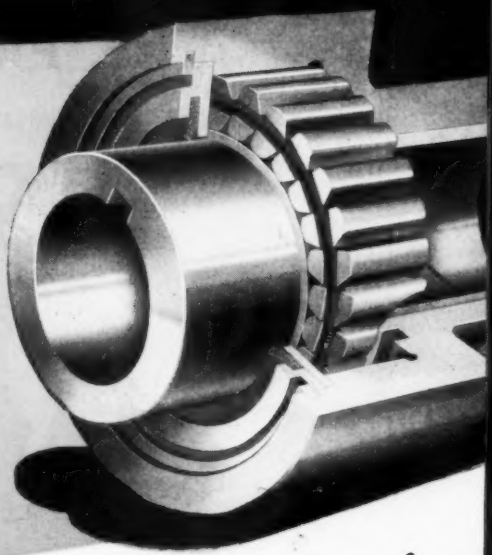

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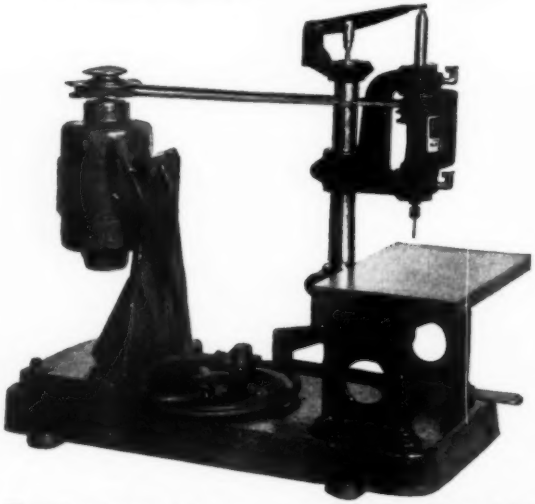

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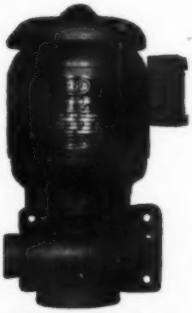

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Frequency in Induction and Dielectric Heating

By DR. RUSSELL A. NIELSON*

WHAT frequency is best for induction heating? For dielectric heating? These are questions that arise whenever the matter of high frequency heating is discussed. Formulae, entailing the use of higher mathematics, are available for determining the answers to these questions. But since a better understanding of the subject can be grasped by the majority when presented from the fundamental point of view, this method will be used in this discussion.

Introduction to frequency heating will begin with the application of very low frequencies and progress up the scale to frequencies as high as one hundred million cycles per second. Such a presentation will cover induction heating, which is the heating of conducting materials, and dielectric heating, which is the heating of insulating materials.

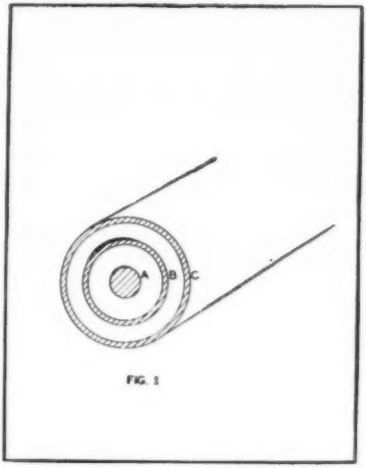

FIG. 1

Induction Heating

While a complicated formula is frequently used to determine the watts into the load for induction heating, there is a method that is very understandable, yet one that gives a good approximation of the power into the load. The first step toward conceiving this method is to investigate where the current flows in a conducting material.

*Manager, High Frequency Laboratory Westinghouse Electric Corporation, Los Angeles, Cal.

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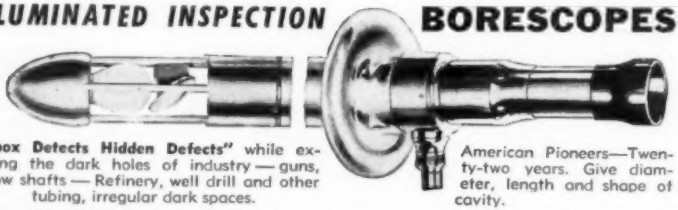

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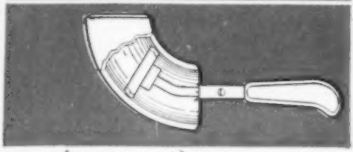
GOES AROUND CORNERS



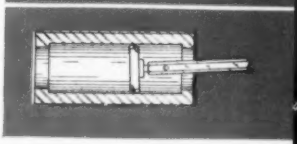
With the DuBo Gage you can even check around corners. Illustration shows a DuBo Gage with specially shaped shank for checking I.D. of an elbow at any point.

Taper enlarging away from the opening can be detected with DuBo Gage without removing part from the machine.

And

You can do other things with the DuBo Gage that you can't even begin to do with a cylindrical plug gage.

GETS BY CONSTRICTIONS



Diameter of entrance of this bore is, by design, .005" to .008" less than central section which is to be checked. DuBo Gage can be entered through constricted opening, and larger diameter can be checked with ease.

DETECTS BACK TAPER

Send us your bore checking problem for engineering review and recommendation.

See the DuBo Gage and other STANDARD GAGE developments at ASTE New Era Exposition.

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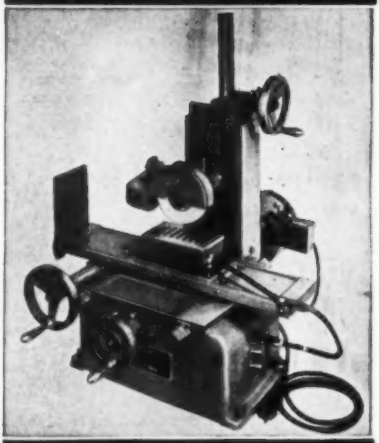

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Once this is understood it is an easy matter to comprehend why power is generated non-uniformly in a conducting material heated inductively by alternating current.

Consider, for example, a round conductor divided into 3 concentric circular sections marked A, B and C as shown in Figure 1. Each section may be considered as an inductance and a resistance in series. Section A is linked by the flux generated by the total of the currents flowing in sections A, B and C; its inductance is, therefore, the maximum. Section B is linked by the flux due to the current flowing in B and C and by the flux from only part of the current in A; its inductance is, therefore, less than that of A. As section C links still less flux, its inductance is the minimum. If the restivity of the cylinder is uniform, the impedance of A is greater than that of B which is in turn greater than that of C. Therefore, more current per unit of area will flow thru C than thru the interior parts of the cylinder. The current actually drops off exponentially from the surface as shown in Fig. 2.

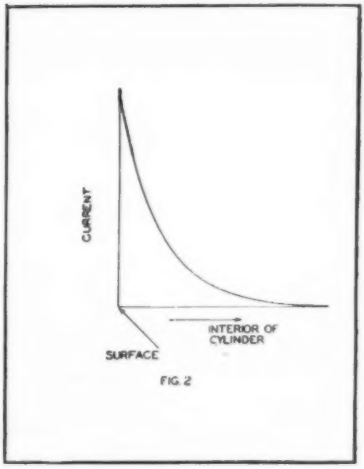

FIG. 2

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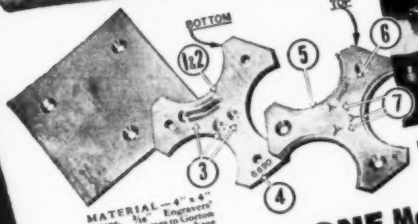

MATERIAL—4" x 4" square, ½" Engravers' Brass, as it comes to Gorton Pantograph, with three holes drilled, countersunk.

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ONE GORTON 3-Z PANTOGRAPH now performs work of several machines, eliminating various tools and fixtures formerly required—saving time and expense of separate machine set-ups and tooling.

SIMPLY BY CHANGING CUTTERS AND TRACING on both sides of a single, Flat Template (Master)—both top and bottom of this intricate part are completed within specified tolerances of ±.0025"—a total of 7 operations, in ⅓ previous time.

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PART—Indicator Plate.

7 OPERATIONS—(1) ROUGH MILL three arc sections...(2) FINISH-MILL sections...(3) MILL semi-circular groove and two 5/32" counterbores...(4) ENGRAVE Part Number ...(5) Reverse Master and Part, PROFILE three U-shaped grooves along arc edges...(6) ENGRAVE word "SPREAD" and (7) ENGRAVE three Y-SLOTS to penetrate counterbores.

CUTTERS—(only 4 needed)—Single Flute, straight-shank End Mills.

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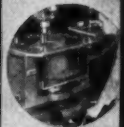
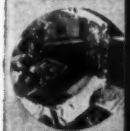

Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING


Tracer-Controlled ENGRAVING

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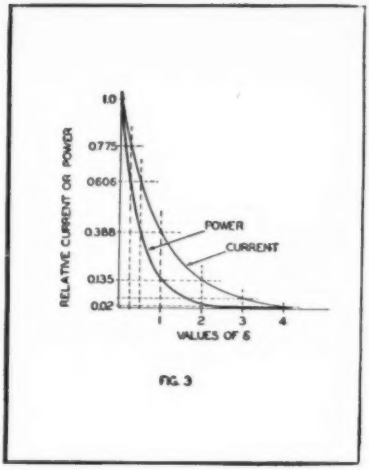

FIG. 3

Because the current tends to stay near the outer surface, this phenomenon is referred to as "skin effect." Fig. 2 applies for all frequencies; the only difference being that a different "distance scale" is used. In Fig. 3 a distance scale has been established in units of delta. Since the current curve is exponential, it is convenient to choose delta as the distance where the current is $\frac{1}{e}$ of its surface value ($\frac{1}{e} = \frac{1}{2.718} = .368$). At the distance two delta, the current is $\frac{1}{e}$ of its value at one delta, i.e., $= .135$ of its surface value.

The heating effect or I^2R loss can also be determined by adding another scale to the ordinate of this curve. Thus the power generated at the distance delta from the surface is approximately ⅛th of its surface value. In fact, 85% of the total heat generated in the cylinder, is generated in the region less than one delta from the surface.

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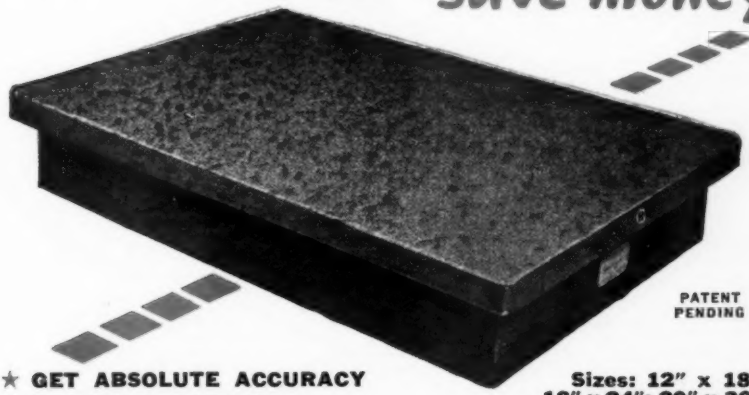

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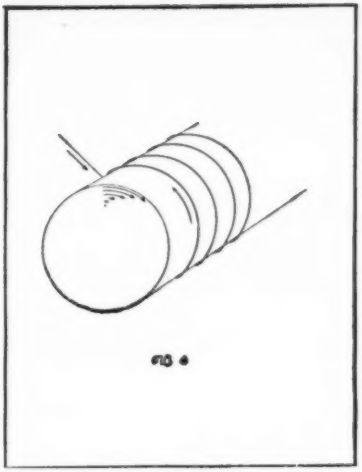


Delta, which is shown as "the depth of penetration," can be defined as:

$$\text{Delta} = 3170 \frac{\text{rho}}{\text{mu} \cdot f} \text{ inches}$$

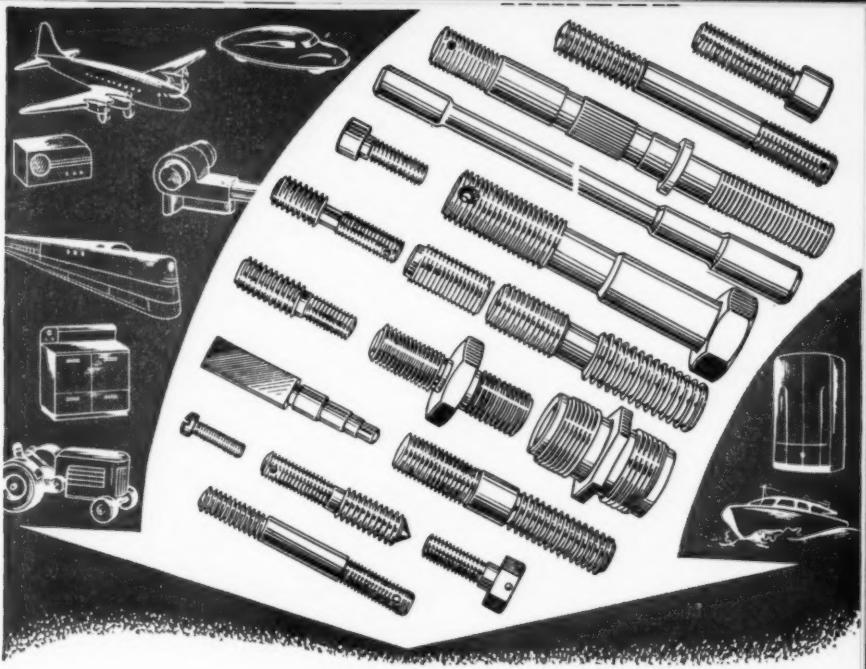
where

rho = resistivity of the cylinder (ohm inches)
f = frequency in cycles
mu = permeability (equals unity for non-magnetic materials)

For a general illustration of induction heating, consider a 3" diameter cylinder surrounded by a work coil as shown in Fig. 4. Alternating current flowing in the work coil induces current to flow around the periphery of the cylinder, being a maximum at the surface and decreasing towards the center according to the formula for the depth of penetration of the current.

By putting the values applicable in this example into our formula, it is possible to find out exactly where the current flows in the cylinder that is to be heated. For copper, at room temperature, and 60 cycle current the depth is:

$$\text{Delta} = 3170 \sqrt{\frac{.66 \times 10^{-6}}{1 \times 60}} = .33"$$



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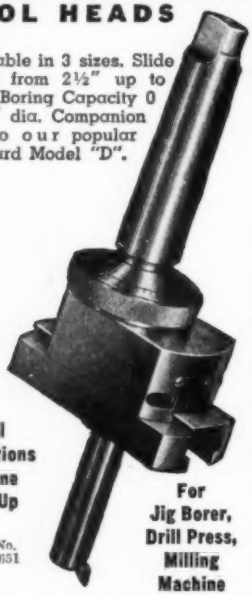

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The current pattern is therefore as shown in Fig. 5, and 85% of the heat will be generated within 1/3" of the surface.

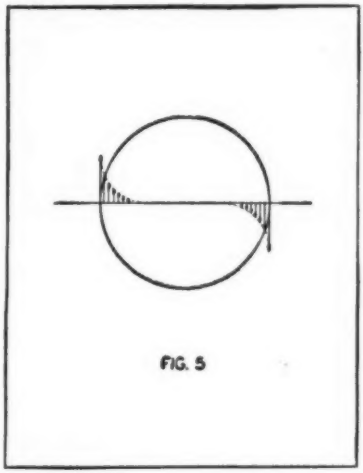

FIG. 5

It is frequently convenient to consider that all the current flowing around the piece is distributed uniformly across a section of thickness delta. Then, knowing the resistivity of the material and the average length of the current path, the power dissipated in the load can be calculated. This will give a value for power loss equivalent to that obtained by integrating the actual power loss over the entire cylinder. For example, in the case of the 3" copper cylinder, depth of penetration was 1/3" and the path length was the periphery of the cylinder. If a one inch length of the cylinder, is considered, then the power dissipated is:

$$\text{Watts per inch of cylinder length} = I^2R$$

$$= (\text{Amps/inch of cyl.})^2 \times \frac{\text{periphery}}{\text{delta}}$$

x rho or if a path along the periphery only one inch long is considered:

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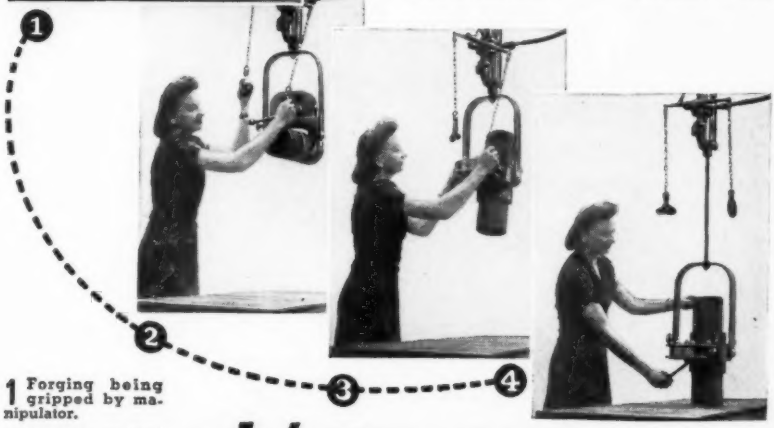

1 Forging being gripped by manipulator.

2 Forging raised and turned to horizontal position for machining.

3 Forging returned to vertical position before lowering.

4 Forging being released in vertical position.

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$$W/in^2 \text{ into cylinder surface} = (amps/in)^2 \times \frac{rho}{delta}$$

$$W/in^2 = (amp/in)^2 \times rho \times \frac{1}{3170}$$

$$\sqrt{\frac{mu \cdot f}{rho}} = (amps/in)^2 \times 3.16 \times 10^{-4}$$

$$\sqrt{mu \cdot f \, rho}$$

The only unknown is the current flowing around the cylinder. In the foregoing example, if the cylinder is put into a long coil, it will act as a single-turn-shorted secondary of a transformer, the primary of which is the work coil. In such a case the number of ampere turns in the secondary equals those of the primary. The amperes per inch in the secondary will then equal the ampere turns per inch of the primary. Thus for a cylinder in a long coil it can be seen that the watts per square inch into the cylinder's surface is independent of the cylinder's size; i.e., in a large cylinder the same current flows in a longer path, thus the larger the diameter of the cylinder, the greater the total heat generated.

If the copper cylinder is heated to 950° F, the only change that occurs is an increase in the resistivity of the copper by a factor of three. This results in an increase in the depth of penetration and in the watts by a factor of the square root of three; thus, there is more heat and it is generated more uniformly thruout the cylinder. It is true in general, that as the temperature of a non-magnetic load is increased, both the power into it and the depth of the heated zone increase. This is due to the fact that the resistivity of metals increases as the temperature rises.

Next consider an iron cylinder at room temperature, the resistivity of which is 4×10^{-6} ohm inches and, the permeability of which shall be arbitrarily assumed as 36. (The actual value of the permeability depends upon the intensity of the magnetic field at the surface of the work; it is thus a function of shape, size, and current in the work coil.) The depth of penetration

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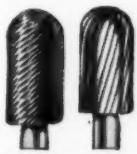

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is .4 that of the copper cylinder (i.e., .13"). However, a change of considerable magnitude has occurred for the power into the cylinder. The increased resistance and the permeability have both contributed to increase the power to almost 15 times that of the copper at room temperature. If this iron cylinder is heated to 1300° F, the increase in resistance results in an increase in the depth of penetration and power input by a factor of three. If the temperature is raised another 150° F, a sudden change occurs; the iron becomes non-magnetic and its permeability drops to unity. This results in an increase in the depth of penetration by a factor of 6 and a corresponding decrease in the power into the work. In the case of all magnetic materials, there occurs quite a sudden change of load as the material passes thru the Curie temperature, which is the transformation temperature, above whch the material is non-magnetic.

As a final example, consider the depth of penetration for a three inch cylinder of stainless steel, the resistivity of which is 13.5×10^{-6} ohm inches. The depth of penetration for 60 cycle current is 1.5". From Fig. 6 it can be seen that the depth of penetration is

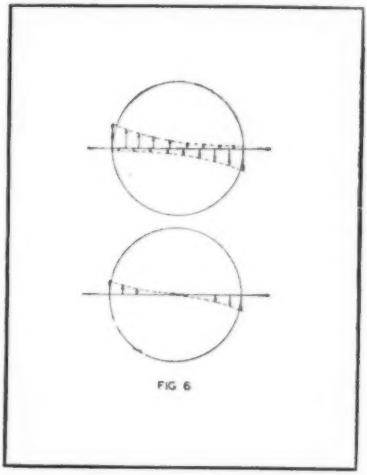

FIG 6

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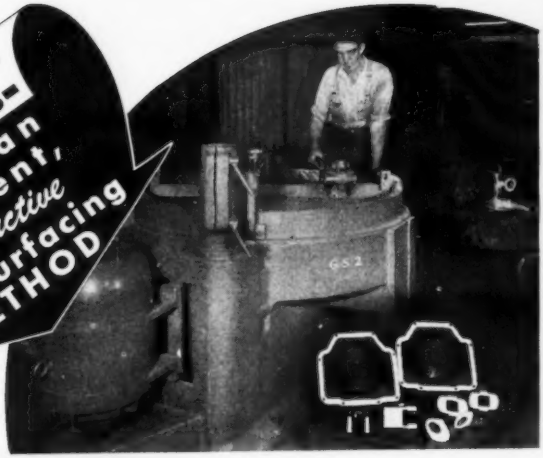

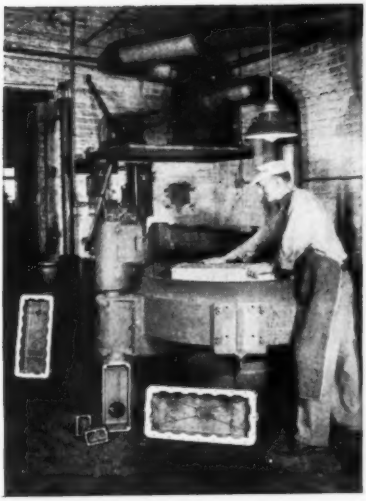

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AT LEFT: Explosion-proof boxes and conduit boxes are being flat-surfaced on a No. 124-53" GARDNER Horizontal Disc GRINDER. Production rates average from 100 per hour on the small parts, to 15 - 20 per hour on the large sizes. Tolerances of .002" to .003" for flatness are maintained.

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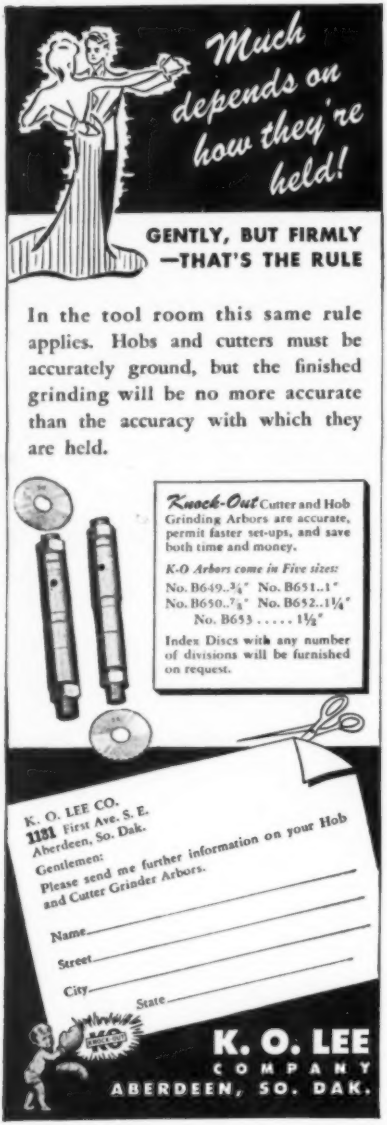
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so deep into the cylinder that the current is far from negligible at its center. The end result is an effective current as shown, and it is obvious that in this case the heating will be reduced considerably below that which was calculated by the formula. In this case, delta was equal to the radius of the cylinder. The smaller delta is compared to the diameter, the more accurate is the formula for power; but it can still be applied so long as delta remains less than 1/3rd the diameter. In cases where the material is not cylindrical, the formula also applies provided delta is less than 1/3rd the minimum dimension.

It has been shown where the heat is generated in a load as a function of the depth of penetration. The frequency, which so far has been 60 cycles, also affects the depth of penetration since the formula for delta contains the factor "square root of frequency." Thus, if the frequency is raised to 6000 cycles, the depth of penetration would be decreased by a factor of 10; if the frequency is 600,000 cycles per second, the depth of penetration is 1/100th of its former value (i.e., it is only .015" for the stainless steel cylinder).

So far the discussion has been confined to where the heat was generated; now a word about the end result. If a piece of metal is to be heated thruout its mass, it can be done in two ways: (1st) by high frequency; (2nd) by low frequency. In the first case the heat is generated close to the surface of the piece and it takes time for the heat to soak into the interior parts; this may be a long time if the piece is large. In the second case, more of the heat will be generated in the deeper sections of the piece. This of course is the preferred way.

Frequently it is desired to heat an area locally, or to surface harden something. Here it is convenient to use high frequency to generate the heat near the surface, and high power to shorten the time that the heat must be applied, for during this time the heat is being conducted away to the interior of the piece and a thicker layer is being brought up to hardening temperature.

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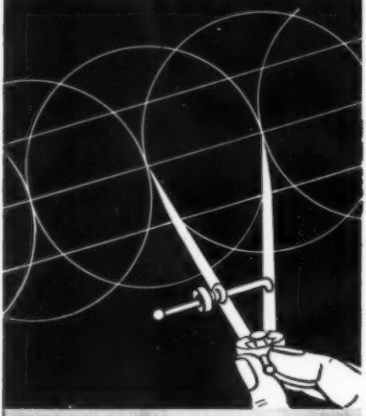

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In other words, case hardening can be done with high frequency and short time or with very high frequency and a somewhat longer time with lower power input. The question that immediately comes to mind is why not just keep raising the frequency so as to further localize the heat. This is done up to frequencies of about one million cycles per second. At frequencies above one megacycle technical difficulties arise. Tho successful hardening has been done at 10 megacycles, one megacycle is generally considered as a working maximum for induction heating.

Now just a word as to the nature of the difficulties encountered, So far a cylinder in a long solenoid has been considered. As the frequency is increased, the impedance of the work coil increases and eventually a limit is reached where even with a minimum of inductance in the work coil, the voltage between turns of the coil or the voltage between the coil and the work has become large enough to cause arcing. Technical difficulties arising from an attempt to get the required power into the work without arcing, is what sets the upper limit of frequency used for induction heating.

From the formula for watts into the load, it can be seen that the power increases as the square root of the frequency. Thus by increasing the frequency, the same heat can be put into the work using fewer turns or less current in the work coil. For example, heating at 600,000 cycles requires 1/10th the ampere turns required for the same heat input at 60 cycles. This large reduction in ampere turns often greatly simplifies the design of coil used at the high frequencies since with small pieces or for heating local areas, the number of ampere turns that can be coupled to the piece or area is often limited.

High frequency induction heating finds many applications in heating of small metal pieces, and its thin depth of penetration indicates its use for case hardening. Where heavy sections are to be heated or hardened, or where a deep heat penetration is required, low frequency—sometimes even below 60 cycles—is used.

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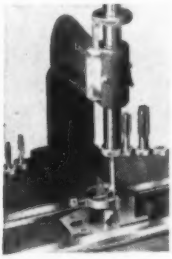

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Dielectric Heating

The heating of insulating materials will be considered next and the material to be heated is the dielectric of a capacitor. The first step is to examine the dielectric to see what causes it to heat when an alternating potential is applied to it.

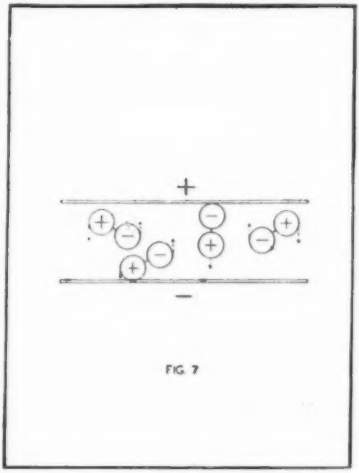

FIG. 7

The molecules of the dielectric consist of positive and negative charges. These charges are so arranged that the density center of the positive charges does not coincide exactly with that of the negative charges. The result is what is termed a dipole. As these dipoles are located between the plates of a capacitor, they find themselves in an alternating electrostatic field. When the top plate is positive, the negative charges are pulled toward it and at the same time the positive charges are pulled toward the lower plate as shown in Fig. 7. The molecules thus tend to rotate or to be stretched in the direction of the field. When the potential reverses, the opposite is true; the positive charges are attracted toward the top and the negative charges toward the bottom. The molecule is thus agitated, and this agitation results in an

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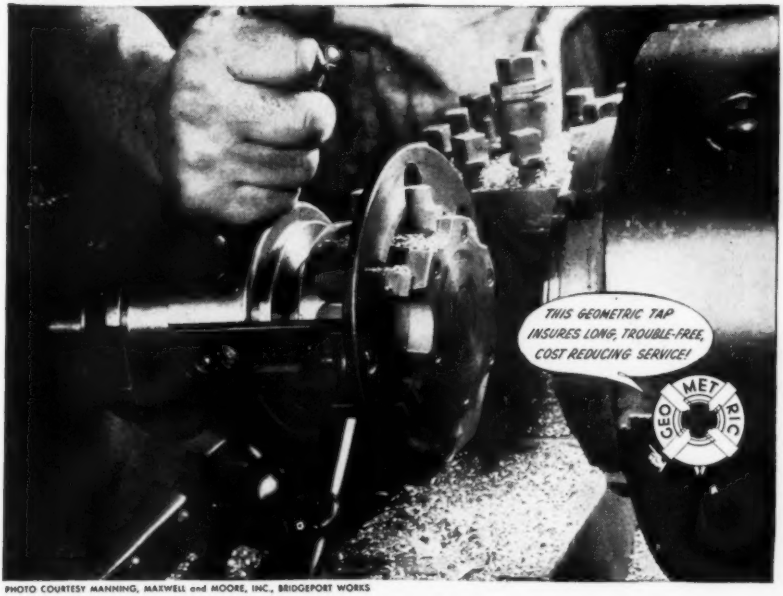

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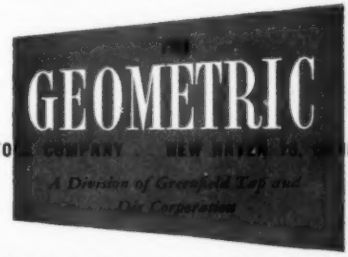

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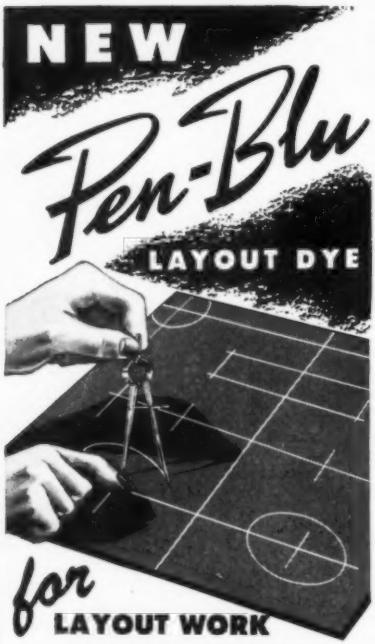

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energy loss of a certain amount per cycle and this loss is transformed into heat in the dielectric. In a homogeneous dielectric, the agitation is the same for all molecules so that heat is generated uniformly thruout the dielectric material. The power loss can be expressed by the formula:

$$W = 1.41 e'' f E^2$$

where

W = watts per cubic inch (into the dielectric)
e" = loss factor (the energy loss per cycle)
f = frequency in cycles
E = voltage gradient (volts per inch across the dielectric)

For low loss materials, the loss factor e" is the product of the power factor and dielectric constant of the material. In general, both the power factor and dielectric constant change slightly with frequency; they are quite dependent on temperature and upon the percentage of moisture in the material, etc. For some materials there is a particular frequency at which the loss factor goes thru a maximum. However, it does not necessarily mean that is the optimum frequency to use for heating. As the power loss is a product of loss factor and frequency, it is often desirable to go to frequencies beyond the maximum loss factor such that the product of loss factor and frequency is larger. The maximum usable voltage gradient decreases slightly with increasing frequency; in other words, at high frequencies there is some tendency for the voltage to flash across either a surface or a gap.

The dominant variable in the power formula is the frequency. For most insulating materials, the frequency must be raised to approximately one million cycles per second before appreciable power is delivered to the dielectric. Three factors dictate what frequency shall be used for any specific heating application. On the low frequency side, the frequency must be high enough to produce heat in reasonable quantities. On the high frequency side, two factors limit the frequency; the first is the question of standing waves and the second is the difficulties encountered in

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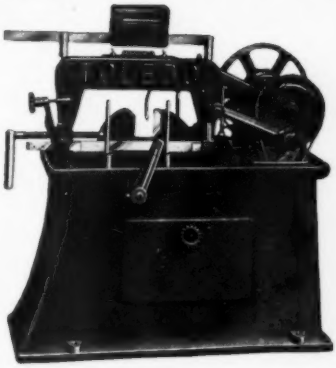

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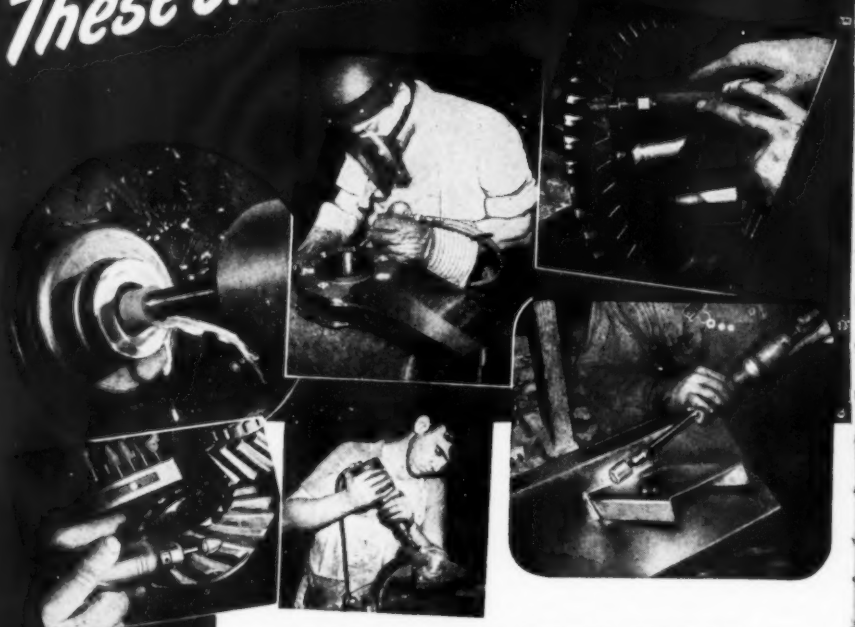

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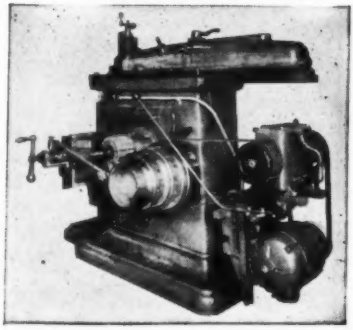

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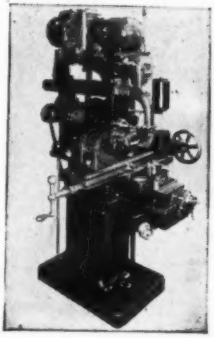

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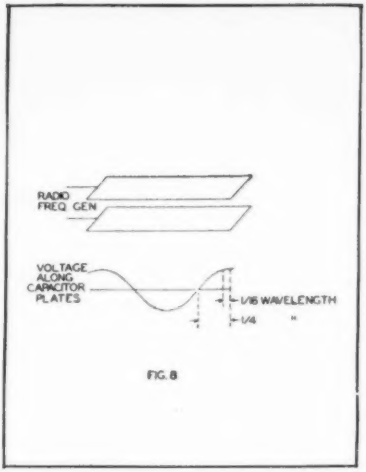

FIG. 8

and with radio frequency generators of high power and high frequency. First, consider the question of the standing waves. Capacitor plates act as open-ended transmission lines with the result that there are standing waves which, at 3 mc and with air as the dielectric, have a wave length of about 325 feet. The variation of voltage along the capacitor is as shown in Fig. 8. Thruout every half wave length there are points where there is no voltage, interspaced by points where the voltage is a maximum. It is obvious from this that if an attempt is made to heat a dielectric material in that capacitor, it would become heated in local regions every half wave length since the heating is proportional to the square of the applied voltage.

In dielectric heating, uniformity of heating is desired and, therefore, the size of the electrodes is limited to about 1/16th wave length. This value is chosen because, as shown in Fig. 8, the voltage across or along an electrode of 1/16th wave length changes by only 7%. Since heating is proportional to the square of the voltage, it is uniform within 14%. If the electrodes are longer than 1/16th wave length, the heating

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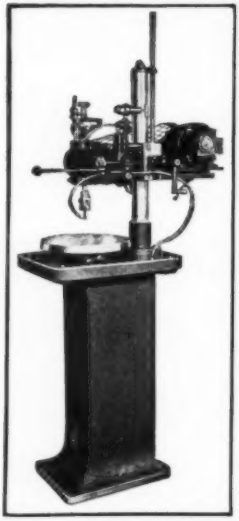

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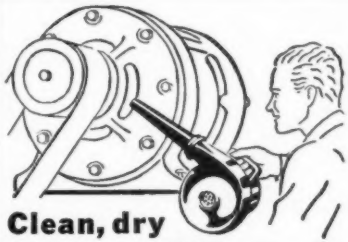
becomes non-uniform very rapidly. Any dielectric placed between the capacitor plates decreases the wave length by the square root of the dielectric constant. If wood whose dielectric constant is about 4 is considered, the wave length has decreased by a factor of 2 and electrodes no longer than 10 feet should be used. In other words, if it is desired to heat something whose dielectric constant is 4 in a set-up where the distance between the capacitor terminals and the farthest end of the capacitor plate is more than 10 feet, a frequency below 3 mc must be used. This will result in a proportionate decrease in the possible power input per cubic inch of material, since the power is directly proportional to the frequency. However, if this piece of wood being used as an example had a maximum dimension of one foot, the frequency could be increased by a factor of 10 which would give a heating rate approaching 10 times that of the former case. In other words, if the same material is considered, and it is desired to heat it rapidly, in general, a frequency as high



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as possible consistent with the dimensions of the piece to be heated should be chosen; the smaller the piece, the higher the frequency that may be used.

There is one further limitation to the power that can be generated within the dielectric, and that concerns the generators themselves. A high power radio frequency oscillator requires a large circulating KVA in its tank circuit. The frequency of an oscillator is given by the formula:

$$f = \frac{1}{6.28\sqrt{LC}}$$

where

f = frequency in cycles
L = inductance (henries)
C = capacity (farads)

The maximum frequency is obtained with a minimum of the product LC. Since the maximum voltage of the tank circuit is generally limited in value, the capacity should be maintained large in order that the KVA shall be large. As the frequency of a high power oscillator approaches 30 to 50 megacycles, it will be found that the limit of decreasing the inductance of the tank circuit has been reached. In fact it becomes nothing more than the leads themselves. Higher frequencies, therefore, require a reduction in the value of the capacitor which means a decrease in the KVA of the tank circuit and therefore in the output of the oscillator. Radio frequency generators above 50 mc are available but at progressively higher frequencies their power output is limited and their use is restricted to heating smaller and smaller pieces of material.

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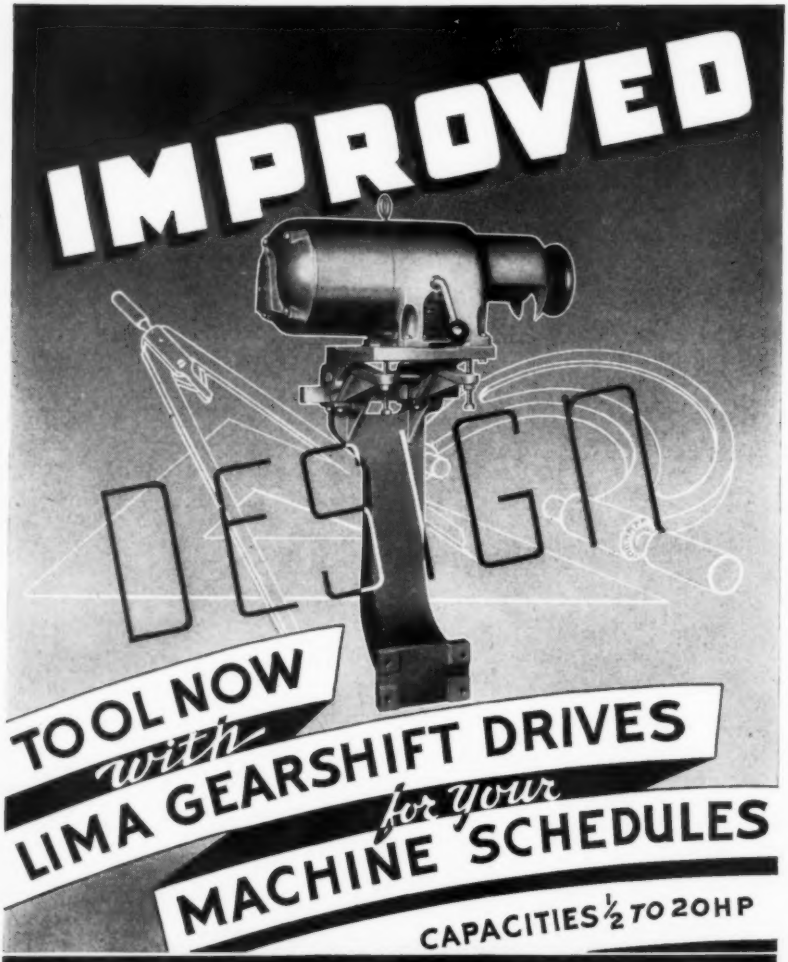

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228 FINDLAY ROAD

LIMA, OHIO

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LIMA GEARSHIFT DRIVES

LIMA PEDESTAL GRINDERS – LIMA ELECTRIC MOTORS

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Whether your product is of old or new design, Chicago "Safety Plus" Socket Screws will provide an extra factor of strength. The knowledge, facilities and experience acquired over 73 years of manufacturing fine threaded products has resulted in a line of fastenings ideally suited to all modern production methods.

Chicago "SAFETY PLUS" line includes:

Socket Head Cap Screws • Socket Set Screws • Stripper Bolts
Square Head Dog Point Set Screws • Pipe Plugs • Keys for "Safety Plus" Products

Complete line includes:

Hexagon Head Cap Screws • Square Head Cup Point Set Screws
Headless Set Screws • Fillister Head Cap Screws • Flat Head Cap Screws • Taper Pins • Milled Studs • Semi-Finished Hexagon Nuts
Semi-Finished Hexagon Castellated Nuts

These Fine Products are sold only thru Authorized Distributors

THE CHICAGO SCREW CO.

ESTABLISHED 1872

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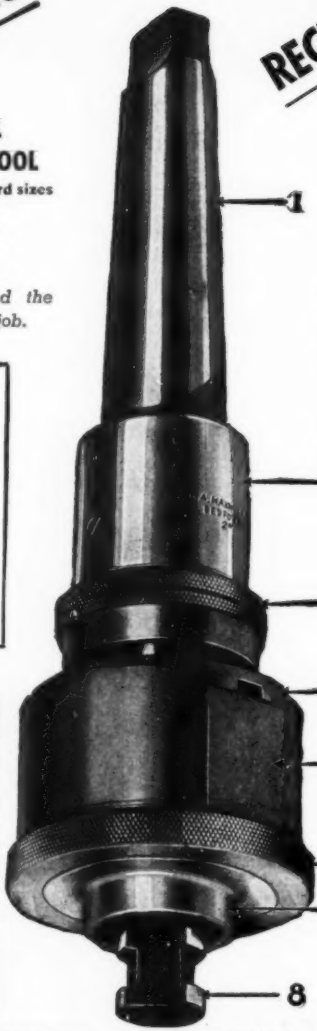
MAXWELL RECESSING TOOL

Made in four standard sizes

1. ⅝" to 1" Cap.
2. 1" to 2" Cap.
3. 2" to 3" Cap.
4. 3" to 4" Cap.

Let us recommend the right tool for your job.

FEATURES
1—SHANK
2—SLEEVE
3—STOP COLLAR
4—BODY
5—TOOL BLOCK
6—PILOT RET. COL.
7—PILOT (Ball Bearing)
8—CUTTER



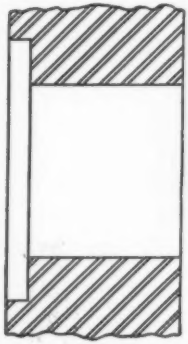
A Rugged Tool for Precision Work.

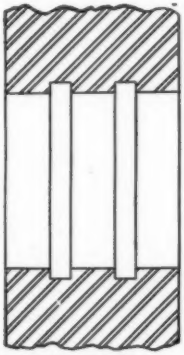
Will Cut one or more grooves any shape or form.

Operation is almost instantaneous, just enter tool pilot in hole and feed to stop. Maintains uniform depth on production runs.

Shanks made to fit your machine, pilots and cutters made to your specifications.

Adaptable to Drill Press, Boring Mill, Turret Lathe, Milling Machine, etc.





F. A. MAXWELL COMPANY – Bedford, Ohio

Heat Treat Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.

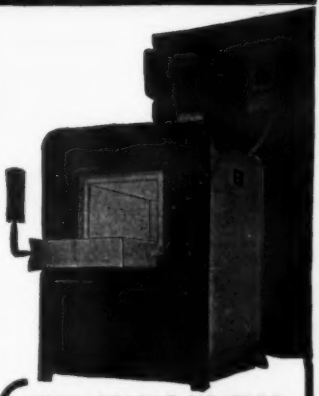
AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
MH-4	10″W 6″H 18″L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refactory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

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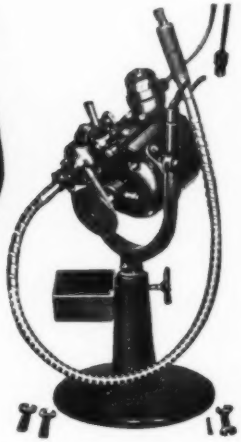
VERTICAL THREE SPEEDS

RIGHT ANGLE HAND PIECE

Ground Cutters High Speed Steel

MACHINES
One Hundred Twenty Five Types and Sizes



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In all the forty years of our business we have never wavered in our original policy of building the very highest quality machines and flexible shafts.

N. A. STRAND AND COMPANY

5005-5009 No. Wolcott Ave. **Chicago 40, Ill., U.S.A.**

Screw Products Industry Uses Compressed Air

THE first air compressor installed several years ago by the National Screw & Manufacturing Co., Cleveland, was for the single purpose of quickly cleaning out electric motors. The variety of air applications in that factory today provides an example of how a manufacturer can extend the applications of this versatile power once it becomes available.

The battery of heading machines for 3/16" machine screws, as well as larger and smaller heading machines, keep up their high-speed output of 234 cold headed blanks a minute with the assistance of compressed air. The method is illustrated in Fig. 1.

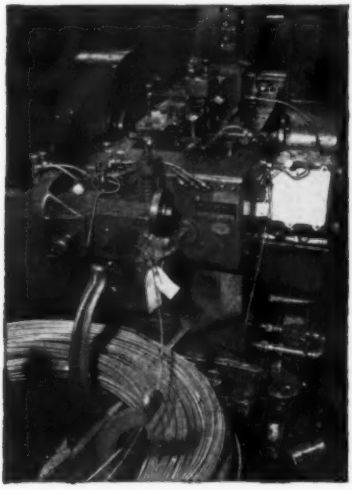

Fig. 1—This double stroke machine spurts out 234 cold headed machine screw blanks a minute. To keep blanks from knicking hammer, compressed air line (first brass tube at right, leading down between hammer and die) applies constant pressure to drive blanks away from hammer.

Fig. 2—Variable speeds up to 70,000 rpm are obtained on this internal grinder with compressed air. The air cylinder, just left of lamp, supplies pressure to the air turbine which is turning the grinder. The tool room is equipped with a number of similar machines for die work.

A small brass air line plays a constant pressure on the headed blanks to keep them from shooting against the hammer and nicking it. This is necessary because of the tendency for a slight taper to form in the die after about two hours' operation, resulting in the ejected blanks shooting towards the hammer instead of dropping im-

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Parts

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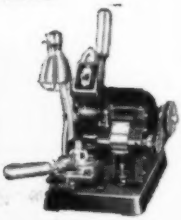
Rouse
HAND
MILLER



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F.O.B. Chicago, Motor Extra

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that Speed Production.

It's easy to make light cuts—fast and accurately—on aluminum, brass, steel and other metals . . . This high-speed, motor-driven unit is ideal for second operations on plastics. *Anyone can quickly learn to run it.* Rouse Fixture Set-Ups increase productive capacity for a large variety of small parts for electrical work, instruments, aviation components, etc.

Available for immediate shipment. Write for illustrated circular and full details.

H. B. ROUSE
AND COMPANY
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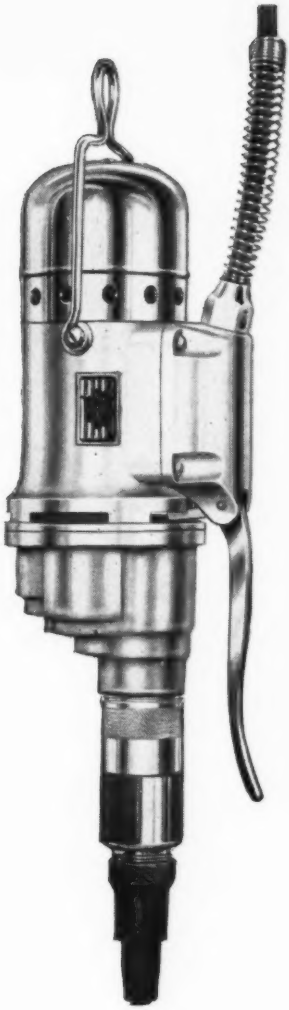
mediately out of the way of the next stroke. The directed air pressure eliminates this difficulty. This saves time in the tool room as well as on the production line.

Dies and hammers and other tools are kept in shape by the company's large tool room force. Here, compressed air has another application. Internal grinders, such as the one shown in Fig. 2, are usually operated at 30,000 revolutions per minute but generally are capable of speeds up to 70,000 revolutions per minute. To get these high and variable speeds with an even draw, the grinders are turned by air turbines. The head of the tool room explains that the grinding job could not be done without compressed air.

Fig. 3—This air-operated grinder gives tool makers variable speeds, steady power and remains cool as long as needed. Here, the hand grinder is being used to polish a wing nut flattening tool.

Hand grinders (see Fig. 3) also are air-operated for similar reasons. In addition to the smooth flow of power



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A SCREW DRIVER PROBLEM

THAT THE NO. 50

CAN NOT HANDLE

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MILLERS FALLS COMPANY
Greenfield, Massachusetts

for Better Belt Joints

To keep belts in service longer, use only GENUINE Clipper Belt Hooks applied with Clipper Belt Lacers.

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Clipper Hooks are made of the finest quality wire—BETTER than ever before—produced for our exclusive use. Hooks hold with firm, sure grip — give longer satisfactory service.

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No. 9 Portable Lacer

The Clipper No. 9 Portable Lacer laces belts up to 6 inches wide in one quick, easy operation. Under powerful pressure hook legs are embedded flush with the surface of the belt and points clinched, making a perfect joint. Phone your mill supply jobber for a demonstration!

CLIPPER BELT LACER COMPANY, Grand Rapids 2, Michigan, U.S.A.

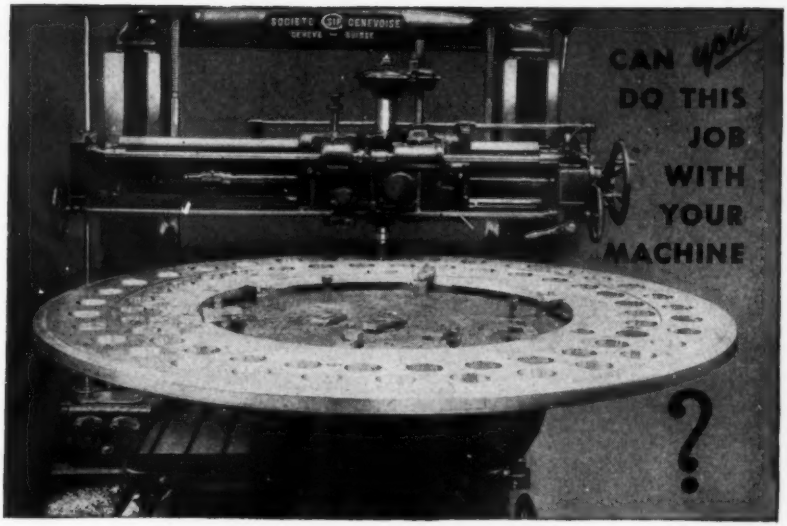
Clipper — Victory is not interruption

Fig. 4—Air hoists such as this one are used thruout the plating department because of their fast action and faithful service in the presence of chemicals from the cleaning solution.

and variable speed obtained from compressed air, the tools remain cool in worker's hands regardless of the length of time they are used.

The air compressor capacity of the plant was increased as the applications for compressed air were expanded beyond that of cleaning electric motors. One compressor in the engine room is steam driven and has a capacity of 356 cubic feet per minute. Two electrically-driven compressors, each of 65 cubic feet per minute capacity, are located conveniently in the several-building plant. Air for the heading machines mentioned is furnished from a 294 cubic feet per minute air compressor. The plating room has another air compressor of 127 cubic feet per minute capacity.

The caustic solution cleaning tanks for screws, bolts and other fasteners to be plated are equipped with air hoists.



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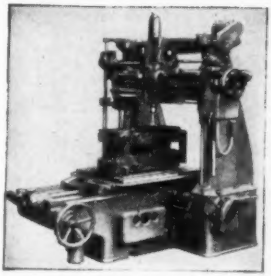
Boring a gigantic circular plate to an exceptionally high degree of accuracy is easy and fast on a SIP Jig Borer . . . and practically impossible on a Jig Borer of conventional design! The double column design of SIP Jig Borers facilitates the handling of work of larger diameters than can ordinarily be accommodated. Large pieces such as that shown above can be extended into the space between the two uprights, instead of being limited by the depth of a throat as in a single-column machine.

Built in five sizes, SIP Jig Borers are again available to American industry. World-famous for their ultra-precision performance, they are designed and built to retain their accuracy, even under the stresses imposed by large, heavy work.

If you need a Jig Borer that can perform to the most exacting limits of accuracy on large jobs or small, write for catalogs describing SIP Jig Borers in full. We can give excellent delivery on all five models listed below.



RANGE OF TABLE SIZES	
No. 2C	18 "x10¾"
No. 3K	21½"x15 "
No. 4G	27½"x23⅝"
No. 5G (illustrated)	43⅜"x32 "
Hydroptic-B	39½"x32 "

We also represent in the United States other world-famous Swiss High Precision Equipment: Andre Bechler — Maag Gear Wheel Co. — Mikron — Safag — Studer — Sallaz — Schaublin — Lienhard — Billeter.

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"SUPER-SPEED" Pneumatic
GRINDER

A 100,000 R.P.M. UNIT

The only hand grinder with spindle speed of 100,000 R.P.M. on 100 pounds of air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand. Weighs only 14 ounces. Prompt delivery on priority-rated orders.

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Fig. 5—Applying stop-off lacquer to racks for carrying pieces to be chrome plated is a constant chore and this air spray gun does the job faster than it could be done by hand methods.

One of these is shown in Fig. 4. Cleaning time varies, but in most cases the time is brief. The fast action of the air hoists in lowering and raising metal baskets filled with parts is an important production factor and is the principal reason why air is the chosen power for hoists. Parts removed from the cleaning solution are quickly dried with an air hose.

An almost never-ending job is that of applying stop-off lacquer to the metal racks which hold the pieces to be chrome plated. This frequent lacquering is done speedily with an air spray gun, as shown in Fig. 5.

The plating department also uses compressed air for cleaning pieces when there is a stubborn scale condition which would require too long an exposure acid cleaning. One sandblaster for large, individual pieces is used and for a number of small pieces, the sand-

ARMSTRONG-BRAY STEELGRIP

STEELGRIP BELT LACING

A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, prevents fraying. 2-piece hinged rocker pins provided. 11 sizes. In boxes, handy packages, cartons and long lengths.

PROMPT SHIPMENT
BELT LACING
Both types from
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BELT HOOKS come with blue aligning cards that prevent waste—every hook can be used. Protects fingers. Applied with a WIREGRIP or any other standard Belt Lacing Machine. 6 sizes.

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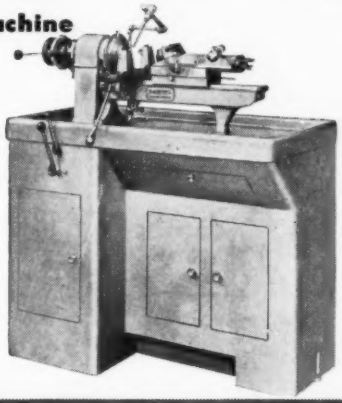
Write for catalog sheets.

ARMSTRONG-BRAY & CO.
"The Belt Lacing People"
5364 Northwest Highway, Chicago 30, U.S.A.

SAVINGS

the dollar sign is on the work...

not on the machine



for example...

One manufacturer was dissatisfied with a lathe used for mass-producing parts requiring close tolerances. Wade engineers recommended a Wade Hand Screw Machine — it did the job faster and more easily, and to specified tolerances. The less expensive Wade was the answer.

Another manufacturer used a cheaper machine with unsatisfactory results. The Wade Hand Screw Machine, although higher in cost, paid for itself in less than 3 months by producing more, in less time, to a higher degree of accuracy.

The cost of the machine is part of the cost per piece produced. Wade engineers, working on this basis, can give you assistance in choosing the right machine for your small parts production. Call on them.

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UNIVERSAL'S
Drill Press TURRET HEAD
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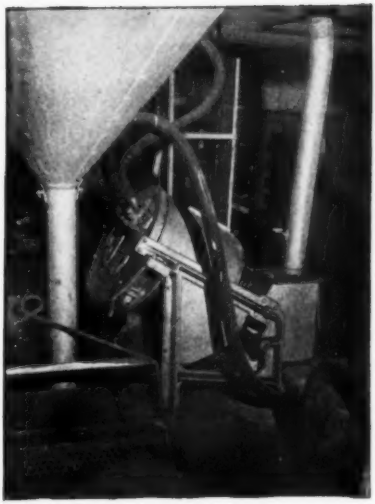


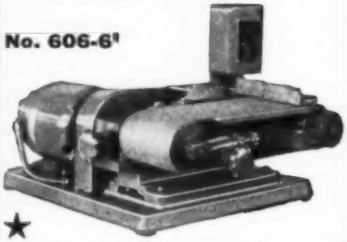
Fig. 6—One of two sandblasters used to clean scale from pieces which are stubborn and do not respond to chemical cleaning.

blaster shown in Fig. 6 is used. Both are operated with air from the same compressor which supplies other plating department needs.

The air compressor which started out as a facility for one maintenance job has led to many additional economies in maintenance and production because the manufacturer was alert and adopted new uses for compressed air.

PEERLESS
BELT SURFACER ★

No. 606-6'



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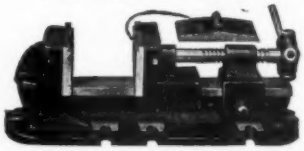

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A Machine Tool designed to give the fine finish and high degree of accuracy necessary in the finest of gage grinding and tool and die making.

It is built with a sturdy ruggedness that maintains that fine accuracy for a long period of time . . . much longer than most similar tools are expected to last.

Such long lasting precision performance gives the inevitable result of greater economy.

Protect Your Tool Dollar with the Finest

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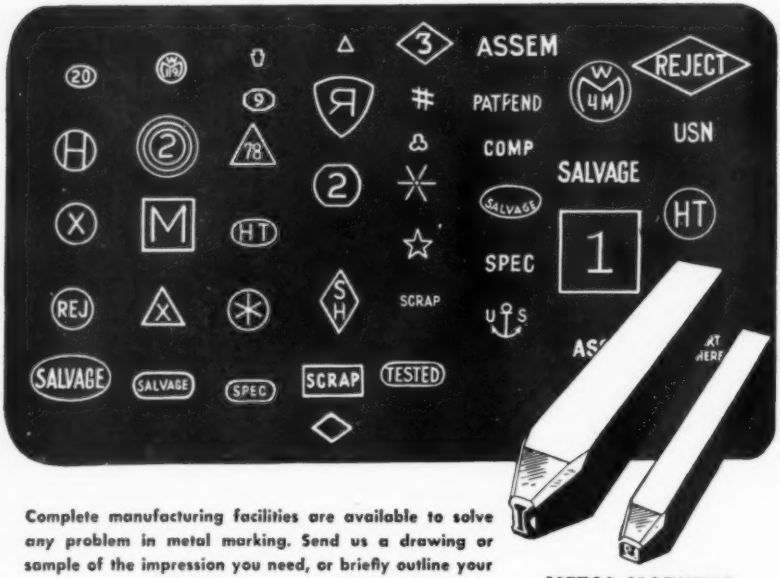
If it's for marking metal

Mercury has it

...or can make it!

Whatever your metal marking need may be—for inspection stamps, individual letters and figures, or complete sets for part numbering—Mercury can fill it! Standard and special inspection stamps like those illustrated, for example, are carried in stock ready for delivery, or can be quickly produced to your requirements if desired.



Complete manufacturing facilities are available to solve any problem in metal marking. Send us a drawing or sample of the impression you need, or briefly outline your requirements for a prompt recommendation. *Full details are yours for the asking—write Department B today.*

METAL MARKING TOOL SPECIALISTS FOR OVER 25 YEARS

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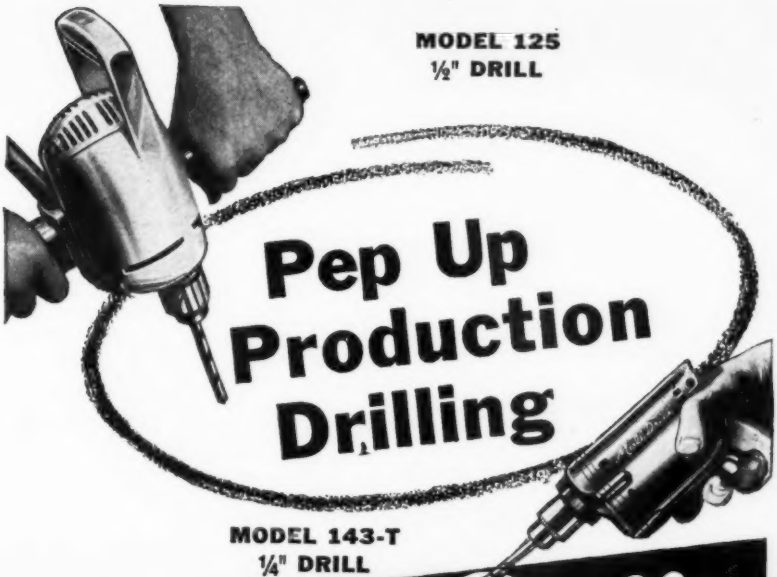

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MALL TOOL COMPANY

7742 South Chicago Ave. **Chicago 19, Illinois**

★ *25 Years of Better Tools For Better Work.*

THE FOREMANSHIP FORUM

By Edmund Mottershead

SPEAK UP!

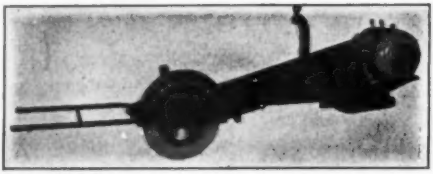
OF all the elements of effective speaking which a foreman or supervisor needs to master, that of a good voice is highly important. Speak up! Let us hear what you have to say without straining to listen. When you are speaking to a group, watch the expression on the face of the person farthest from you. If you are speaking loudly enough for him to hear, you are getting your message across vocally.

You have probably listened to the man whose voice somehow reminds you of the sound of tin being torn. You have probably listened to the so-called orator with the sing-song melodious intonation. Some voices are breathy; some are hoarse and harsh; others are too nasal. Ask yourself: — "Is my voice reasonably pleasant?" Chances are, you haven't given it much thought. But ask a few of your friends, or have an inexpensive recording made of your voice at some music store. You'll have trouble recognizing your own voice when you hear it on a record for the first time.

We all know what a monotone is in the voices to which we listen . . . the continual use of a single level of pitch. But a voice can be monotonous in volume and speed as well. To get your message across vocally you must make it emphatic, varied, colorful and interesting.

Have you ever spent several hours listening to the radio broadcasts of the national nominating convention of either of the major parties? One feature stands out in them; by the end of half an hour the speakers obviously are **tired**. When your voice tires, tension sets in, and faults such as monotony and hoarseness, which were otherwise absent, begin to show. Can you talk for any length of time without tiring your voice? In this discussion, a

MUMMERT-DIXON SWING FRAME GRINDERS



- Standard sizes for 24", 20", 16", 14" and 12" wheels.
- For high speed wheels at 9,000 to 10,000 sfpm, or vitrified wheels at 5600 to 6000 sfpm.
- V-Belt Driven — Two speeds.
- Convenient speed change.
- No balancing weights required.

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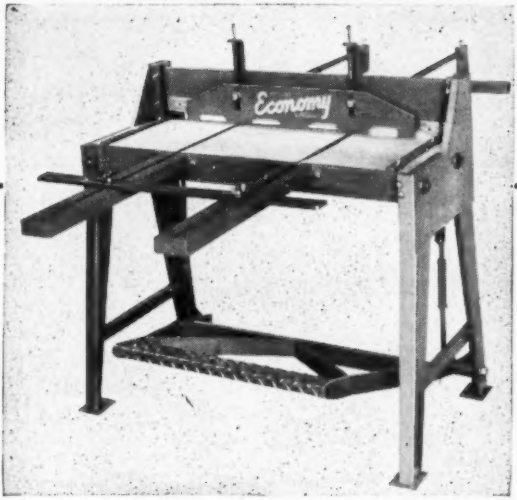
MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.



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A newly designed Foot Power Squaring Shear. Suitable for cutting 16 gauge soft steel and lighter. Unbreakable, all-steel welded frame. Strongly reinforced to avoid any springing or deflection even when cutting to full capacity of machine.

Knife bar reinforced, operates in machined slides, with bronze gibs. Provided with front and back gauges that can easily be adjusted to required size.

Spring hold-down is provided for holding stock close to the bed when cutting.

***Manufactured by the* ECONOMY TOOL & GAUGE CO.**

PRICE: F. O. B. TRUCK, CHICAGO, ILLINOIS — $225.00

IMMEDIATE SHIPMENT

Exclusive distributors:

ACME EQUIPMENT COMPANY

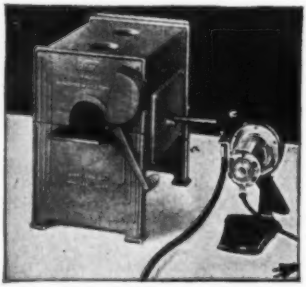
126-128 SOUTH CLINTON STREET ANDover 3430 CHICAGO 6, ILLINOIS

"Stark"

"ELECTROBLAST"

High Speed Muffle Furnace

attains high speed heat in 20 minutes



No. 1 Furnace, as shown, muffle opening 7 x 3⅛ x 2⅛" complete with independent blower or torch and metal gas hose.....$70.

No. 2 Furnace, muffle opening 7x4⅝x3½" with built-in blower & gas hose. $138.

Operate on city or tank gas for 7 to 10 cents per hour.

Built of best materials, they do high grade small work handily and efficiently

Adequate pyrometer equipment extra, if desired.

Write to us

Stark Tool Company

Established 1862

WALTHAM, MASSACHUSETTS

Originators of the American Bench Lathe

few suggestions are offered that will help.

What Is Required

1—It should be easy to hear;
2—That means pleasant to hear;
3—It should be interesting to hear.
4—There should be no evidence of fatigue.

In order for your voice to be easy to hear, you must have two things:—sufficient volume and clear articulation. Your voice is made of breath, punctuated with consonants. Or you might imagine your voice as a continuous vowel tone carved into words by consonants. Clear articulation depends upon properly using the articulators:—tongue, teeth, lips, palate, jaw. Remember: to be easy to hear, you must have:

1—Plenty of breath.
2—Clear articulation.

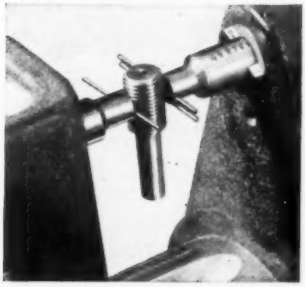
Pleasantness in a voice consists of several things. Listen to the voices you hear on your radio every day. Which do you like the best? Why? What do you call the quality that voice has? Probably resonance, for resonance is the basis of "pleasingness" in your voice. The second element is proper normal pitch.

Normal pitch in your speaking voice means the range of four or five tones you use most of the time with greatest comfort when your voice is properly used. Many people seem to have high pitched voices, yet when tested on the scale at the piano, they have as great a range as almost anyone else. The same is true of those whose voices seem habitually very deep.

The average human voice has a range in men of slightly less than two octaves and in women about two and a half octaves. The normal pitch for speaking should be somewhere near and possibly a little below the middle of this range.

In order for your voice to be pleasant, you need to have:

TWO *New* APPLICATIONS
OF CARBOLOY CEMENTED CARBIDES
To LINCOLN PARK GAGING EQUIPMENT

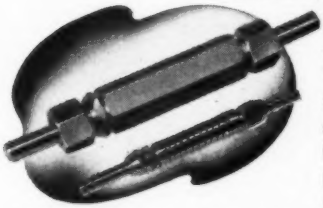


Thread and Gear Measuring Wires

Ground and lapped to standard tolerances closer than National Bureau of Standards specifications. Retain accuracy at least fifty times longer than can be expected of the best steel wires. Possibility of "flats" developing, with resultant inaccurate readings, is eliminated.

Wires for N. S. 4 to 36 pitch are available from stock.

Wire Type Plug Gages



Produced in a size range from .025" to .375" and are made to Class XX and X tolerances.

Solid Carboloy wire type gage members assure long, accurate gage life—at least fifty times that expected of similar members made of steel. Their wear-resistance allows users to disregard wear allowance for gage life and to take advantage of full print tolerances.

An exclusive feature of these gages is the flexible all-metal handle supplied for sizes up to 3/16". As illustrated at the right, hazard of breakage of members due to accident or rough handling is reduced to a minimum.

Completely descriptive bulletins on both of these new Lincoln Park Products will be sent you upon request. Write for your copies today.

Lincoln Park INDUSTRIES, INC.

1731 FERRIS AVENUE • DETROIT 25, MICHIGAN

THREAD-ALL Tapper

PRECISION TAPPING !! LICKED !!

By Converting Any Drill Press into a Precision Tapping Machine.

Check these advantages:

Handles small taps without fear of breakage. Takes sizes up to 1½" with ease.

Gives precision tapping without need of lead screws.

Electro-magnetically controlled positive depth setting.

No adjustments required for tap sizes.

Silent forward and automatic high speed reverse action.

Taps right or left hand without adjustment.

Machine may be used for drilling, reaming, counterboring, etc. without adjustment.

Write for full details.

GRUEN GAUGE CO.

10039 Marcus Ave. Detroit, Mich.

1—Good resonance.
2—Proper normal pitch.

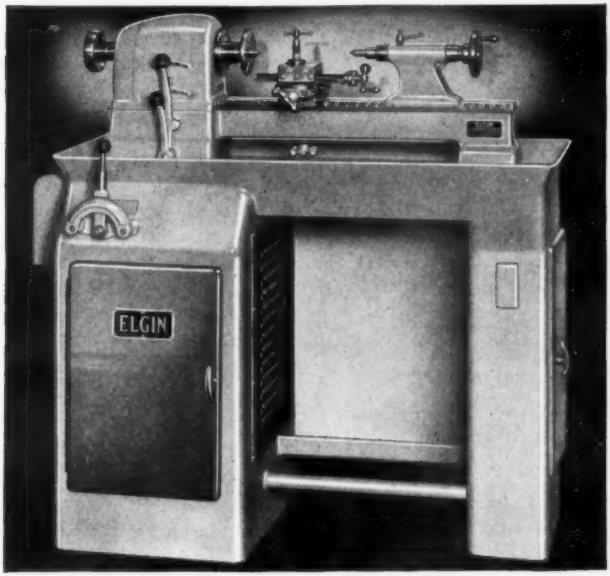
How often have you heard the comment made of someone else:—"My, he's an interesting conversationalist!" What did they mean? That the person mentioned was interesting to listen to . . . his voice held their attention. What are the elements of the interesting voice? Variation, phrasing, and emphasis.

Many speakers have what we call "speech patterns". These can be found in either the pitch of the voice, the rate of speaking, or the volume. Simple monotony of rate or pitch or volume is the commonest pattern, altho many people having one fault, also have one or more of the others. Some people speak rapidly, jerking out two or three words, catching a breath, jerking out two or three more words, catching another breath, and so on. Many people consciously try to vary the pitches of their voices and thus end up with a sing-song up and down which in itself never varies. Do you let your voice rise in pitch at the end of a question? Many people do not. Do you let your voice drop at the end of a sentence? Many people do not. Make a record of your voice some time and listen to see what patterns you have. Such patterns make for monotony and eventually kill listener interest even if they do not positively annoy your hearers.

Phrasing simply means that instead of breathing just anywhere in a sentence, you breath at the end of a complete phrase or thought. And when you breathe, pause. Don't just snatch a breath and hurry on. The pause gives your words time to sink in, giving your listeners time to grasp your meaning. The pause also emphasizes your ideas, making them stand out strongly.

"White space" in advertising is recognized as a sound principle of copy writing and layout. Your hearers like their ideas and word pictures outlined in pauses.

In whatever you say, you will have some idea, some word, which is more



ELGIN Now Provides Operator Comfort

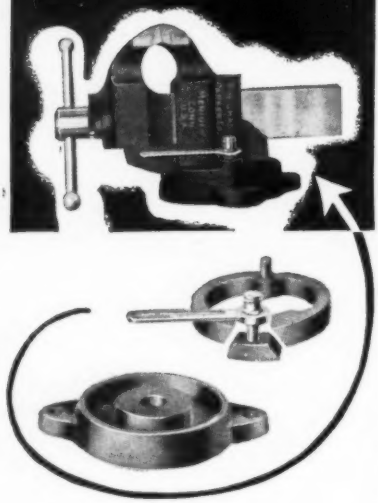
- The "Elgin Line" now is furnished with knee-hole bases with foot rests, permitting operator to sit comfortably, close-up and directly in front of work.
- Motor is mounted in base with direct cross ventilation.
- Three shelves are provided on right hand side.
- Collet board is on left hand door, below the convenient centralized controls.
- Variable speed drive provides stepless spindle speeds from 40 to 4000 rpm.

Write for full details.

ELGIN TOOL WORKS

1772 BERTEAU AT RAVENSWOOD AVE. – CHICAGO, 13 ILL.

The Vise that "WELDS" Work to The Bench



with "BRAKE BLOCK" HOLDING POWER HERE

The swivel base on Parker Vises locks all the way round like an automobile brake. You swing the vise to the easiest position, turn the wrench, and your work, the vise and the workbench are one piece. Ask your distributor about the other five features of Parker Vises. The Charles Parker Company, Meriden, Connecticut.

PARKER VISES

America's First Vise Maker

important than the rest. It requires special **emphasis.** If you are sincere, if you feel deeply what you are saying, you put the whole force of your personality back of these particular words. This quality, this FORCE, is the characteristic which makes some words dramatic and dynamic and others dull and lifeless. If you live your speech, it will have force. To make your voice interesting, then, use:

1—Variation.
2—Pauses for phrasing.
3—Force or emphasis.

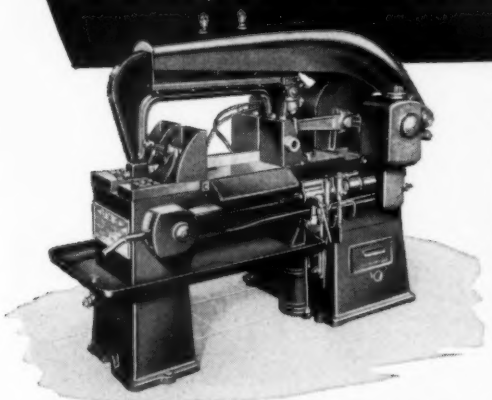
The fourth demand upon your voice as a speaker is that it be tireless, or nearly so. You must be able to speak for a considerable length of time before fatigue brings tension and trouble. How are you going to do this? RELAX!

Don't just relax like a sack of potatoes stood in a corner . . . slumped and humped all over. You must remain standing erectly. You must remain alert. But by having correct posture, by breathing deeply, you can maintain this control of your body and still eliminate all tension. When one brake band in your car is tighter than another, one wheel will "grab" and cause you to swerve. The tension is out of balance. When you are tense in one part of your body, something else must compensate for it. When your throat is tense, your jaw seems to tighten up also. Relax these and balance is restored.

Practice breathing while lying down with a couple of books on your abdomen. Watch them move up and down as you breathe. Stand up and breathe the same way, relaxed, chest high, back straight as you were when lying down. If you want a tireless voice, remember: RELAX.

As a foreman or supervisor in a modern industrial plant, it may very well be that you will have another speaking situation to face other than that of face-to-face with one person or a group: speaking into a microphone,

5 reasons why
YOU SHOULD USE RACINE MACHINES



1. **EASY OPERATION**—a single lever at the operator's fingertips controls all operating functions.
2. **OPEN FRONT** — quick, easy loading, special fixtures readily placed.
3. **CORRECT PRINCIPLE**—progressive feed throughout cutting stroke insures maximum depth of cut.
4. **EXTRA POWER** — hydraulic system more than adequate to handle any overload.
5. **ECONOMICAL OPERATION** — the few moving parts are extra heavy and rugged, no failures here.

FOR ALL YOUR METAL CUTTING WORK

Before you mill, drill, bore or grind a part made of metal, you must cut it off. Current, late model Racine Machines will "cut your cutting costs." All of them employ thin blades progressively applied. They are fast and accurate, save time and material.

Hydraulic feed and pressure provide a smooth, oil-cushioned cutting action. The blade cuts deep, taking out long, thin, curled chips. Power requirements are low. True faces reduce subsequent machining operations and eliminate waste of stock.

These modern machines are available in all capacities from 6" x 6" to 20" x 20". Automatic bar-feed models produce multiple pieces like an automatic screw machine.

Get all the facts on this equipment for your maintenance, tool room and production metal cutting. Racine engineers and field service men will cheerfully submit studied recommendations. Write today for the latest data. RACINE TOOL & MACHINE COMPANY, 1754 State Street, Racine, Wis.

RACINE OIL HYDRAULIC PUMPS AND VALVES

For power movements in machines in your plant or in any of your products, investigate RACINE HYDRAULIC equipment. Variable Volume Oil Hydraulic Pumps to 30 G.P.M. capacity. Pressures to 1000 p.s.i. Also a complete line of Hydraulic Valves in all sizes from ⅜" to 1½". Ask for Catalog P-10-C.

RACINE

STANDARD FOR QUALITY AND PRECISION

ENGINEERS
DRAFTSMEN
DESIGNERS
RAPIDESIGN
DETAILER
IN 1 TRIAL ITS VALUE WILL SPEAK FOR ITSELF
MAKES FRIENDS QUICKLY
Save TIME
MORE SPEED—MORE ACCURACY
A quality and precision made detailer for utmost efficiency. 9" scale graduated in 32nds. Scale, sizes and center lines impressed . . . cannot rub off. A guaranteed, accurate combination instrument with scale, triangle and guide templates for standard detailing.
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Please send me literature describing RapiDesign Detailer #201 with prices.
NAME
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CITY
STATE

either public address system or intercom.

In thinking about the special problems of speaking over a "mike", the first is that your first words must get attention. Sentences should be short and simple. You should avoid sibilant sounds such as S: Z: SH: SZ: SH: CH: J and others as well as word combinations that are difficult to pronounce. Use the every day language of common conversation.

However, there are some purely mechanical problems that just "being conversational" will not solve. The mike itself is a very delicate instrument, and the gradual technical improvements from year to year only make it more so. Every speech defect, every voice fault, every cough, sneeze, whisper, rattling or other noise is picked up and magnified. Consequently, it is necessary as far as possible to eliminate all extraneous noises.

The various noises or hesitation, "and-uh", "er-uh", "umm", "ah-er" and the like are particularly offensive. All these snorts and grunts and lingering voice sounds break down the effectiveness of what you have to say. They must be eliminated. After all, such noises are simply a continuation of voice tone during a pause when you are thinking of the next word, or waiting for what you have said to sink in. Pause, frequently, but pause cleanly.

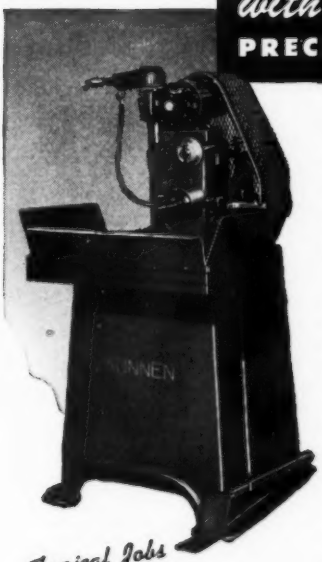
Many mikes favor the lower vibration frequencies, which is why so many women's voices do not come through well. Not that an extremely low voice is necessary, but the normal middle and lower register of your voice will carry best. The mike also sometimes distorts certain sounds. Nasal twangs, a breathy tone, extreme emphasis on sibilant sounds; all these need to be avoided.

Most mikes have definite limitations in responding to violent changes in the volume of sound. The sudden increase in volume of sound has sometimes been known to blast the mike to the extent that the mechanism was ruined. For reasons of emphasis and interestingness

TOLERANCE, .0002" FINISH, 10 MICRO INCHES

On Bearing Races at National Sewing Machine Co.

with the SUNNEN PRECISION HONING MACHINE



That's typical Sunnen performance on a production basis. These races are heat treated steel with a C scale Rockwell of 60-62.

The versatility of the Sunnen Precision Hone is demonstrated in this plant, where jobs ranging from an inside diameter of .1895" to 2" are handled. Even on the larger pieces, tolerances are never over .0005".

This is another example of the many hundreds of uses for the Sunnen Precision Hone on jobs where accuracy and smooth finish are important. This machine will accurately hone any internal diameter from .120" to 2.625" with a guaranteed accuracy of .0001". Holes are straight and true and can be given a finish that is exceptionally smooth — often 2 to 3 micro inches.

Find out how the Sunnen Precision Hone can be used in your plant. A Sunnen engineer will show you how it can help you get greater accuracy and smoother finish in less time — or write for free bulletin giving complete details.

Typical Jobs

Automobile Distributor Shaft Gears Taper removed at a rate of 80-90 per hour.

Aircraft Valve Guide. Valve tappet roller pin hole honed to 6 micro inch finish.

Roller Bearing Outer Race. Finish improved from 12 micro inches to 2 micro inches.

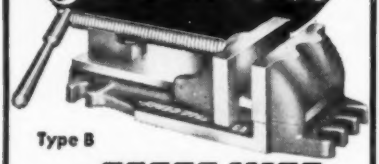
Compressor Yoke. Alignment maintained and better finish produced.

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.

SUNNEN PRODUCTS COMPANY, 7935 Manchester Ave., St. Louis 17, Mo.

Canadian Factory: Chatham, Ontario

SPEED UP with Cardinal



Type B

-SPEED VISE-

Locks and unlocks with a half turn. Opens to its full opening and closes instantly. Rugged—built for production work.

Model 4-AV Automatic

-AIR VISE-

Increases production TEN TIMES or more. Opens and closes automatically. Long-life valves and controls built-in.

Write for New Bulletins

CARDINAL MACHINE COMPANY

Glendale, California

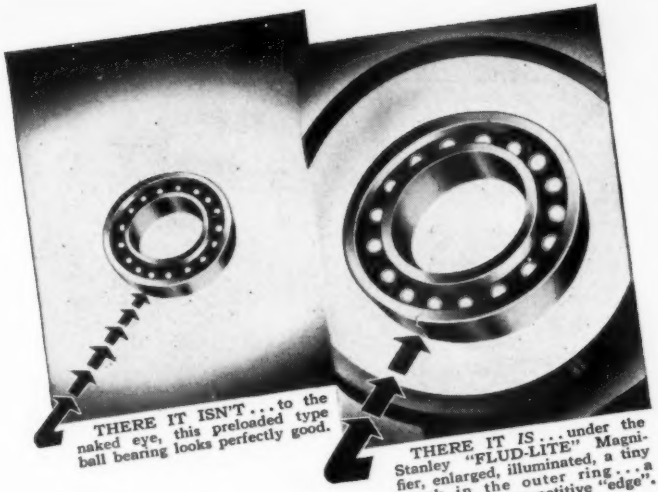
in your voice, variations in pitch and speed, the use of pauses, and proper placement of tone with good resonance are the tools of the speaker.

The problem of how close you should be to the microphone for your tone to be picked up well varies with the speaker and the apparatus. Assuming standard good studio accoustical conditions, and a normal baritone quality of voice in the middle register, speak in a conversational tone as though your listener were five feet or so away. With the velocity or ribbon type mike, you might stand three or four feet away and directly in front of it; with the inductor or dynamic type, a foot and a half away and in front; with the "8-ball" type, three feet away from any side of it.

If you have to talk over a public address system in a large room where you can still see your listeners and they can see you, don't appear to talk right into the mike. Talk past it and **to your listeners.**

Remember above all, that a speech to a group is just conversation with one person grown up a little bigger. In conversation, your listener can hear your voice easily and clearly distinguish your words, at least most of the time. In speaking before a group, you just iron out the little mannerisms and non-essentials that are possible in ordinary conversation. You speak more loudly and more slowly because the room is larger and more people must hear you. You speak more distinctly for the same reason. Everything is a little larger, but it is still conversational.

One final hint:—whatever your work or daily routine, you certainly can find 10 minutes to devote to yourself. Spend those 10 minutes with a book, newspaper or magazine reading aloud. There is no other single exercise so simple and so easy to do that will do as much to improve your speaking. Read aloud, if you like, to your children, stories, or maybe the funnies. But read ALOUD . . . DAILY.



THERE IT ISN'T . . . to the naked eye, this preloaded type ball bearing looks perfectly good.

THERE IT IS . . . under the Stanley "FLUD-LITE" Magnifier, enlarged, illuminated, a tiny crack in the outer ring . . . a "wrong-way" competitive "edge".

SEE the difference that makes ALL THE DIFFERENCE

Where the limits of ordinary vision stop, that's where Stanley "FLUD-LITE" Magnifiers take over. They show your precision workers and inspectors a whole new world of "unseen" opportunities to refine and make more uniform every product you make. They show up the differences that make all the difference.

That's worth a lot of money to you . . . but the cost is very small. And they're typical Stanley production aids. A 5" diameter magnifying lens with a 13" focal length is mounted in a friction-arm, swivel-jointed bench frame, without base for permanent mounting on machines or in a portable hand-tool frame. Shadow-free fluorescent illumination is scientifically focused. Easily adjustable to individual worker's vision and position.

"FLUD-LITE" Magnifiers help your workers do better work by helping them to see better. That's good sense, good investment. Now available for prompt delivery. Call your distributor or write for illustrated folder. Stanley Electric Tools, New Britain, Connecticut.

STANLEY

STANLEY ELECTRIC TOOLS

NO OTHER TOOL LIKE **H&H** RECIPROCATING ACTION

PORTABLE *Electric* TOOL

★ COMPLETE WITH MOTOR ★

Motion is "in and out"—not spinning or rotary. Tool is portable—carry it anywhere—five pounds—easy to handle. Self powered. Ready to plug into any 110 volt electric outlet. Built to supplant hand finishing, and for bench work, on metal, wood, plastic or other materials that require filing, burring, honing or polishing. Delivers 1000 short, accurate strokes per minute, much faster than hand methods, no chattering. Complete line of files, scrapers, hones and other accessories available. Change accessories in 20 seconds because no other parts need be removed or added. Used in largest plants and small shops. Prompt shipments. *Send for catalog.*

H&H RESEARCH CO.
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DELIVERY

Normal shipments on receipt of your order

★ ***ENGINEERED TO*** *supplant hand finishing, and for bench work.*

★ ***SELF POWERED***—*one complete unit, no power unit to buy—no motor to attach.*

TOOLS FOR EVERY INDUSTRY

MOTORS SHIP BUILDING

FARM IMPLEMENTS OIL DRILLS

THIS 72 PAGE CASE BOUND CATALOG SHOWS PICTURES, SIZES, PRICES, SPEEDS, etc. OF ALL OUR PRODUCTS

YOURS FOR THE ASKING

WIRE FOR DETAILS AND DELIVERY DATA—
WE'LL GIVE YOU QUICK ACTION!

DRAWING ROOM KINKS

By H. F. WILLIAMS

OVER a period of years in drafting work, numerous peculiarities of drawing paper and tracing cloth become evident. These materials are not stable. Unless drawings are made in a continuously dry atmosphere they do not scale in accordance with the dimensions. Probably the best method for such accuracy of dimensions that has been advanced is one used in England before the war in ship work. The drawings had to be necessarily long and yet the dimensions had to be accurate. The heavy paper was sponged with clean water and stretched on the boards with edges glued down. As the paper dried, it shrank over the surface of the board as tightly as a drum head.

In our modern industries we do not have time for such procedures. Heavy paper has given place to vellum so that blueprints do not have to wait for ink tracings. Vellum type papers, for the sake of transparency, contain oil. This however does not make them atmosphere or moisture-proof. In fact, perspiration will make such drawings wrinkle, pucker and curl. When tacking down such a sheet this method will result in a smooth and tight surface. Insert one tack, smooth with the palm of a dry hand towards the corner diagonally from the first tack and tack that corner. Starting at the approximate center of the paper smooth and pull toward the third corner, tack, and repeat toward the fourth corner and tack.

Before leaving in the evening it is well to cover the board with oil cloth

NEW GAGE SAVINGS!

SCHNACKE *ADJUSTABLE* FLUSH PIN GAGE

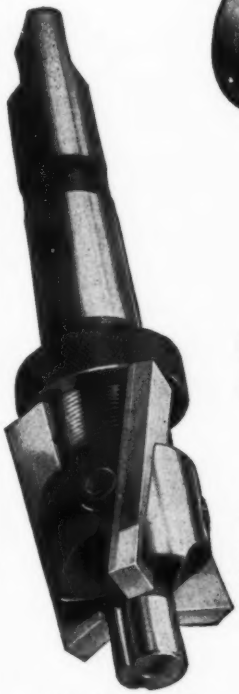
With this new adjustable gage, you can have an accurate Flush Pin Depth Gage quickly and save time and money. Serves many varied gaging purposes in production and inspection. Set consists of 3 interchangeable depth rods (1"-2"-3") and 1" diameter sliding anvil, adjustable to required depth. Sliding tolerance feelers at the top are set with micrometer screw from plus or minus .000 to .200 and locks firmly with double locks. Standard set applicable to any decimal dimension up to 3.00".

Special anvils and longer rods are also available. Write for descriptive circular.

SCHNACKE, INC.

1018 E. Columbia St. Evansville, Ind.

GENESEE ADJUSTABLE HOLLOW MILLS



(Standard Style H)
Facing & Counterboring
Tool

Cut Cost – Increase Production

with GENESEE inserted blade—

ADJUSTABLE HOLLOW MILLS

FACING & COUNTERBORING TOOLS

SPECIAL PRODUCTION TOOLS

Backed by 35 years experience our Engineering Department is always ready to serve you in your Production Tool problems.

Write for complete Catalog No. 42-J

GENESEE

MANUFACTURING CO., Inc.

ROCHESTER 4, N. Y.

or similar material. To assure freedom from expansion remove all but two tacks, these two being in diagonal corners. When using tracing cloth the same procedure is followed.

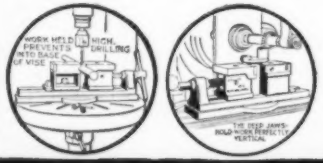
Usually a heavy piece of drawing paper is tacked on the board upon which the vellum rests. Some men use 15 or 20 tacks or as many staples to attach the paper. Next day they have to remove all the fastenings and smooth out the paper and retack. Only four tacks should be used, one in each corner.

Because the heavy paper usually is procured in rolls, the convex side should be upwards when it is attached to the board. It smooths down better because there are no upturned edges. Whether tee-square, straight edge or the scales of a drafting machine are used, the sheets lie flatter than if the concave side of the rolled paper is placed upwards.

Because vellum is so thin and very likely numerous sizes of drawings are made and because many tack holes appear in the mat paper, accidents frequently occur to the vellum. When drawing lines, the pencil rides over a tack hole, sinks in and causes ripped drawings. If a piece of heavy drawing paper is cut one inch larger each way over the size of vellum sheet used, in addition to the original board cover, and used between it and the vellum, such accidents will not occur. This second mat is only used for its particular size of sheet and will have tack holes only at the four corners and none in the center. Used in this way, these loose mats will last many months and permit a saving in paper.

At times the drafting department is required to make blueprints from wellnigh opaque paper. Very light prints result. While there are solutions available from the drafting supply houses to make opaque sheets transparent, a mixture of 1/3 machine oil and 2/3 gasoline can be used. Placed on the back of the drawing and blotted, this will facilitate printing. Left in the open, the paper soon assumes its opaqueness again.

SEND FOR BULLETIN No. 23-B

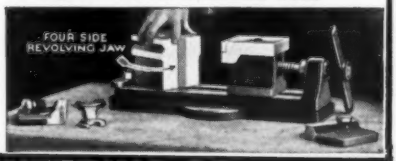


KEEPS MACHINISTS FROM WASTING TIME

You will eliminate many costly hours from your payroll by using the JACKSON TIME-SAVING VISE. It saves the time wasted by your Machinists in hunting for Bolts, Clamps, Angle Plates, etc., when rigging up work on the Drill Press, Miller, etc. Of still greater importance is the saving in output you effect by not having your productive machine standing idle during the rigging up process, for the—

JACKSON TIME-SAVING VISE

by means of its revolving jaw and supplementary jaws instantly holds the thousands of shapes that arise in machine work.

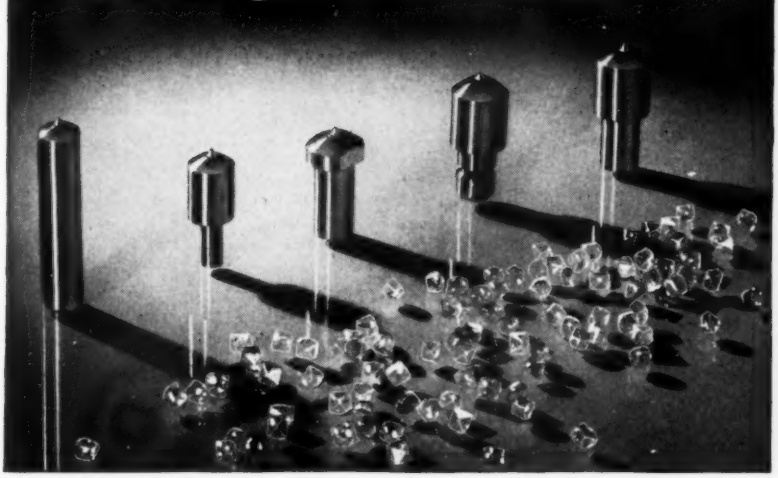


BROWN ENGINEERING CO.

126 NORTH 3RD ST. READING, PENNA.

DO YOU USE

STANDARD *Diamond Tools*



Much of America's wheel dressing on standard grinding machines is done with these standard wheel dressing diamond tools. In addition to the standard grinding machine dressers shown, the Wheel Trueing line includes dressing tools of every kind for standard thread grinding machines, turning and boring tools, radius forming tools and gage tools.

These tools are the result of many years of study and research on regular work, under actual shop conditions. These studies have been concentrated almost exclusively upon diamond behaviour and diamond characteristics in relation to wheel and work, for, the diamond, being the active element, is the all-important element in any diamond tool.

The logical result of this research and development is that Wheel Trueing tools have been brought to a degree of perfection which many users consider to be the highest in the diamond tool industry.

If you use standard wheel dressing diamond tools in straight or form grinding, thread grinding, turning or boring, radius forming or gaging, send for Wheel Trueing's free illustrated booklets dealing with these various types of standard tools.

WHEEL TRUEING TOOL COMPANY
3200 W. Davison Avenue • Detroit 6, Michigan

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878 Langlois Avenue • Windsor, Ontario

THE ADAMANT TOOL COMPANY
Eastern Division of Wheel Trueing Tool Co.
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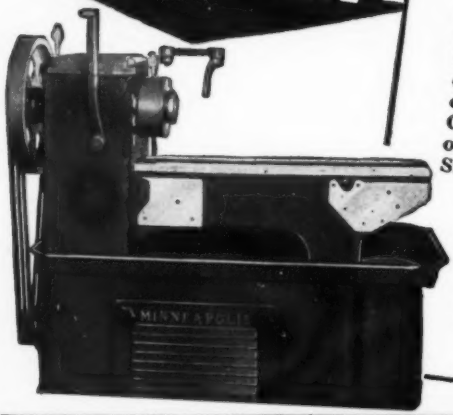

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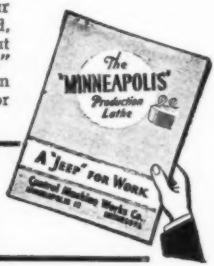

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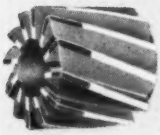

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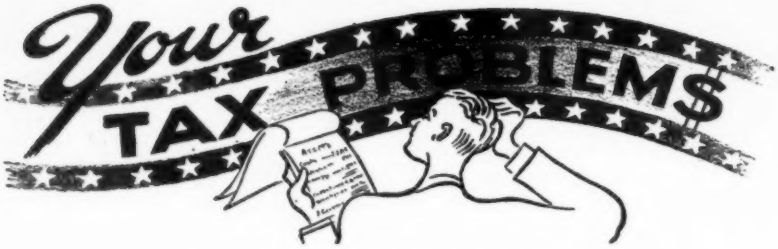
HI-SPEED OR CARBIDE-TIPPED



SURVEYING THE TAX HORIZON

By ARTHUR ROBERTS

MUCH stress is placed upon the necessity of reducing government expenses in order to cut the income tax rates but few stop to consider that these rates, to a much larger degree, are controlled by factors in our economic system outside the scope of government economy. The tax rate is a measure of our economic equilibrium.

Take production. If output is kept in low because of strikes, price controls or lack of capital for investment, the net profit earned by industrialists will be limited, the government may effect economies and yet the tax rate must be geared high to pay government expenses.

The degree of expansion is an important factor affecting tax revenue and the tax rate. Few businessmen care to invest in new or old enterprises if the tax rate is too high because the return will not compensate for the risk. Adventurers in business enterprises demand a good return because the risk is high. This is only natural. Price control and high taxation are hindrances to business extension so they keep tax revenue down and the rate high. If this government would revert to prewar expenditures, we might clear the hurdles with limited expansion and lower output but, considering the increased responsibilites to which America is committed, such a hope is baseless. To keep the rate low, we must keep the revenue high and this means all-out expansion and production backed by efficient sales promotion to induce consumers to buy heavily.

The speculative upswing is another factor that will tend to reduce funds for conservative business investment.

A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.

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ONE OF THE HANDIEST TOOLS YOU COULD OWN

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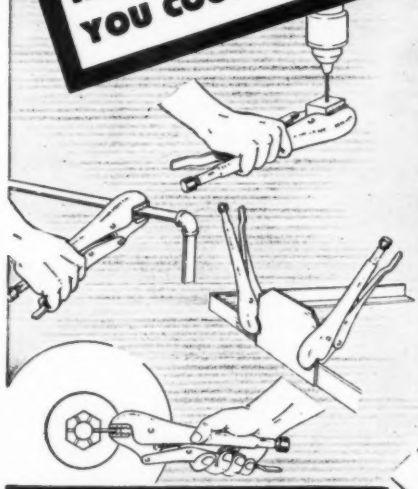
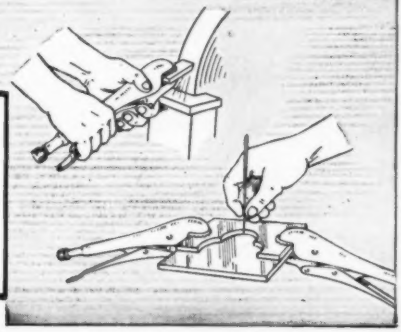
. . . THE TOOL OF A THOUSAND USES

Holds anything of any shape, securely—for drilling, welding, grinding, riveting, machining. Combines portability, convenience and simplicity of pliers with powerful gripping advantage of locked vise. Jaws are forged steel with milled teeth. All parts heat treated for extreme wear resistance. Ten inches long, jaw opening 1¼", weighs 18 ounces.





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Those who might otherwise invest in new enterprises are speculating because the return is higher and the hazards less. Trying to start a new business today with labor difficulties, high costs and government restrictions of one kind or another is a bigger headache and more of a hazard than playing the stock market, investing in real estate or commodity speculation.

Hanging over all America is a deficit of $278 billions and this is a first mortgage on business because businessmen, not the workers, have to think up ways and means to pay this mortgage. The per capita share of the national debt as it now stands is $2,000 and it will take the combined total income tax payments of 34 million persons earning up to $4,000 a year to pay off the five billion dollars of annual interest charges alone on the public debt but businessmen, from the corner grocer to the big corporation, must make it possible for most of these taxpayers to get the incomes from which to make tax payments. Taxes taken from consumers reduce buying power, which affects production and net profit adversely, reduces tax revenue and keeps the tax rate high.

If the deficit is to be paid off, and we can't carry this load forever, the revenue taken for this purpose may be a threat to full employment despite the all-out efforts of businessmen to keep production output at tops. If consumer income is cut by taxation to meet current government expenditures, reduction of the Federal debt and interest thereon, there is that much less buying power to keep the wheels moving and that much less employment. In 1939, the national output was around $60 billions so the deficit today is about five times our total factory turn-out in a prewar year. This gives some idea of how heavily businessmen are mortgaged outside of their own books.

Confidence is an intangible factor that touches the degree of taxation. Many businessmen, who view our eco-

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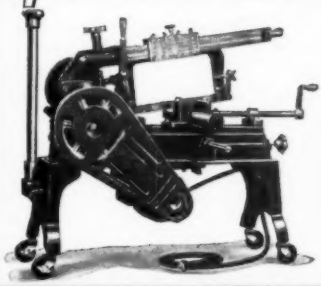

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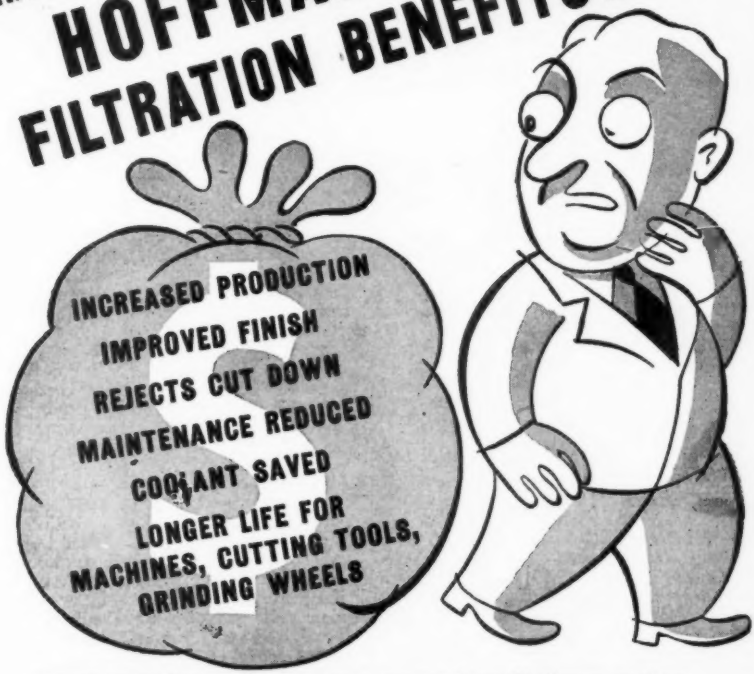

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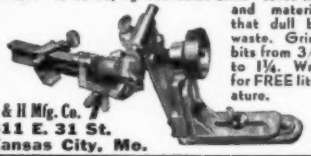
NEW LOW COST
DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time and materials that dull bits waste. Grinds bits from 3/16 to 1¼. Write for FREE literature.



T & H Mfg. Co.
811 E. 31 St.
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nomic machine with reason and not emotion, lack confidence in its performance unless the deficit is reduced substantially. Obviously, under such a psychological cloud, they do not do their best and income is curtailed. The emotionally-minded businessman, on the other hand, assumes that business is fine when speculation is producing a mirage, when output and sales volume are off but the stock market is spiraling upward. He is more the gambler than the businessman. When prices run wild in our economic system, some may clean up, the papers may herald a boom, but for every dollar won, somewhere, sometime, somebody loses a dollar eventually, the axe falls and trouble begins. Such minds hope for inflation to make a killing and feel that this is an easy way to pay off the deficit but the benefit will be spun of gossamer for eventually we all must pay the Piper.

The degree of taxation depends upon national income but national income may be affected by international factors, more so today than ever before because we are moving toward the conception of one world. If we lend money to other countries with wild abandon, that means high taxation, even tho our own economy is operating smoothly. If we expect these loans to be repaid, we must expect to buy goods from other countries. If these goods come to our markets, fewer of our own goods will be sold, which will affect employment adversely, cut national income and keep the tax rate up.

All of this means that surface-thinking now is out, that factors which control the destiny of American business are so complex and touch so many elements that businessmen must broaden their viewpoints on problems of taxation and other business subjects. The profit and loss statement, which was the only worry of prewar businessmen, is still of importance but it is essential to consider many other factors when appraising managerial efficiency and budgeting for future operation.

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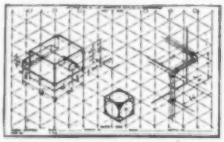

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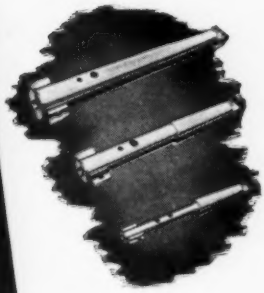
4 REASONS WHY MADISON REAMERS CUT TIME AND COSTS

The simplified design and operational features of Madison Production Reaming Tools will enable you to cut your reaming time and hole costs to the minimum. Easy to adjust, to maintain and always aligned, the free, smooth cutting action of Madison Reamers has provided the answer to industry's need for greater speed and economy in reaming operations. Check the four reasons for Madison efficiency listed below.



MIRROR-SMOOTH FINISH

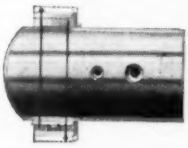
The cutting blades of a Madison Reamer produce a mirror-like finish that in most cases does not require an additional finishing operation. Since Madison cutters are pre-sized, any number may be stored in a crib. The Madison one-screw adjustment feature insures that both blades always cut, by eliminating possibility of unequal cutter blade expansion.

BETTER CHIP CLEARANCE

Because Madison Reamers have no multiple inserted blades, there is more room for chip clearance and circulation of coolant. Thus, danger of clogging and resultant overheating is eliminated, and shrinking or tapering of the hole prevented. Further insurance against hole distortion is provided by Madison's freer cutting action, which permits work to be held very lightly. This makes Madison Reamers ideally suited to the machining of the new, lightweight metals.

INTERCHANGEABILITY

Since Madison cutters are pre-sized, they are interchangeable in Madison bars. A sharp cutter can be inserted in a Madison bar in a matter of seconds without disturbing the original set-up. Keeping a sharp cutter in operation at all times assures more continuously uniform work and the holding of required tolerances. The two-bladed Madison cutter will naturally require less maintenance time.



CONTROLLED FLOAT

Because the Madison cutter is floated in its bar at the exact point where the cutting action takes place, float can be better controlled and indicated for greater uniformity on long-time production jobs. Chances for bell mouth and bar wobbling are eliminated. No special floating tool holders and chucks are necessary.

MADISON
MANUFACTURING COMPANY
DEPT. B-6, MUSKEGON, MICHIGAN

Madisons are used for rigid or float reaming on lathes, drills, millers and special machines. Used on hard and soft metals and plastics. Write for the Madison catalog—lists complete lines, prices and grinding instructions.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

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New Nesting Type Tote Pans

20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

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BRIDGEPORT, CONN.

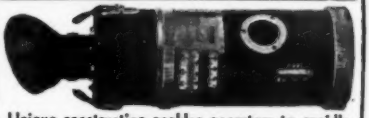
Naturally, all businessmen want low taxes but merely clamoring for this objective will not avail unless all issues thereto are considered and analyzed intelligently. If taxes must be kept high, there is little use griping. This only raises the blood-pressure and makes it more difficult to think clearly about one's problems. The logical thinker will accept the inevitable and figure out how to surmount the difficulties presented just as a mariner wheels his ship clear of the rocks. The more rocks there are, the more difficult the job, the more alert the mariner, and so be it with the businessman who breasts the turbulent waters of this postwar era.

One thing that does much to confuse is the double-talk broadcasted from radios, printed in newspapers and emanating from Washington. One official will decry the coming of inflation, will point to the millions spent by revelers in night clubs, at horse races and in Florida hot spots as assurance that the boom is on the way. Another official will cry over heavy unemployment in the offing. The two statements, and many others like them, do not check. Big spenders have always been with us. Diamond Jim Brady and his ilk of the gay nineties could make our shekel-shovers look like pikers and there were bread lines then. The garbled facts and figures flung at us from all sides bewilder and stymie efforts to follow a sane course unless the listener does some thinking on his own. An isolated statement here and there does not tell enough of the story to give a clear perspective any more than the labor cost in a factory is a guide to operating efficiency. The businessman must have other figures, output, materials used and overhead, to get four-square understanding. Too many businessmen today consider only one element of our economy or harken to self-appointed prophets who harp upon only one string. Moreover, there never was a time in the history of our country when businessmen of the day did not have weighty problems and probably these problems were relatively as great as ours.

BREMIL MFG. COMPANY
1700 Pitts. Ave., Erie, Pa.

ALL-ALLOY compound lever strap cutter. Cuts 1¼ strap with one stroke.

PYRO THE SIMPLIFIED OPTICAL PYROMETER



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

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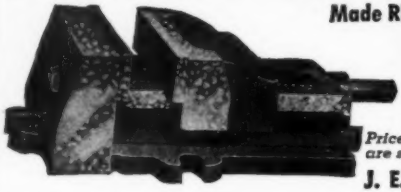

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No. 2—10" jaws, 2¼" deep, opens 8½", wt. 90 lbs. $38.00

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The efficient business manager of the future must be a practical economist, not a traditional economist steeped in the rules of time, place, utility, etc., because these general rules were concocted in mid-Victorian times by Englishmen and do not apply today. Moreover, then the economists had few figures to prove their theories, and even if they had, the figures would have been based on very restricted activities compared to today. The practical economist accepts only one law of traditional economy as enduring and that is the law of supply and demand. Sad to relate, this law is considered persona non grata by many government planners when it should be made the basis of all calculation and allowed free and unrestricted operation. It is when this law is traduced, either by government or businessmen, and businessmen have been guilty of this transgression too, that our economy breaks out in a rash.

WESTINGHOUSE FORUM DATES

The practical applications of adjustable speed drive will be described by prominent machine tool engineers as one of the features of the 1946 Westinghouse Machine Tool Electrification Forum to be held at the William Penn Hotel, Pittsburgh, Pa., on April 9-10. Another feature will be a report on the progress of standardization of electrical equipment for machine tools.

This will be the tenth annual Forum sponsored by the Westinghouse Electric Corp. The Forum is planned to give machine tool engineers and executives of the machine tool builders an opportunity to discuss electrical problems relative to the design and function of machine tools.

R. L. Gaylord, President of Ingersoll Milling Machine Co., will address the confereees at the banquet that will close the Forum.

W. E. Knox, Vice-President of Westinghouse International Co., will present some significant developments in electrical trends in foreign markets.

The first day of the forum will be devoted entirely to the discussion of specific problems of applying electrical equipment to machine tools, therefore, undoubtedly will be of interest principally to electrical engineers. On the second day a program of interest principally to the executives and commercial representatives of the machine tool industry will be presented.

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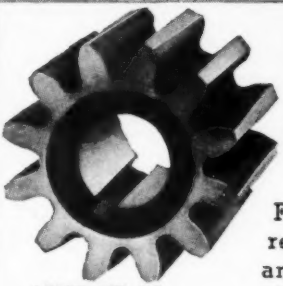
THE GLENNY Adjustable · Expansion *Push* BROACH



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1/4" keyway, 1/8" deep in Aluminum Sleeve. A quantity production operation.

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10 TIMES FASTER

than a shaper

Factories everywhere are replacing many keyway and slotting operations with the Glenny Broach on an arbor press or other equipment. They report savings of 10 times or better, with every piece machined to an accuracy of + .0005".

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ONE KEYWAY OR QUANTITY PRODUCTION

Whether an occasional keyway or slot, or quantities, the Glenny Broach will save production time and costs.

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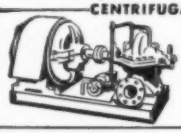
Government-owned surplus tools of every description being released to industry can help you reconvert. It is the job of the War Assets Corporation to dispose of this surplus property quickly and effectively. Toward that end we ask you to follow this simple 3 step procedure:

1. Submit in writing your requirements for machine tools and industrial equipment to us now.
2. Send a typewritten list to your nearest office listed below.
3. Make your descriptions brief, one line if possible, clearly grouping various types of equipment you need.

CENTRIFUGAL PUMPS



Available at most agencies in sizes 1½" to 6", complete with prime mover, usually electric motor driven.

Write, wire or phone your requests to the nearest RFC agency listed below for more detailed information. Credit terms may be arranged. If your local office does not have all the equipment you need, it will endeavor to locate it from other offices throughout the country.

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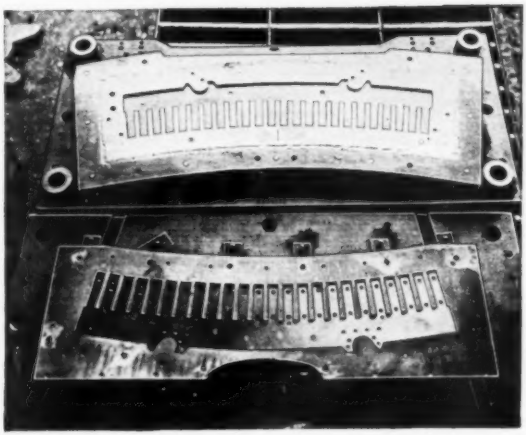

In the past, long narrow coil slots in compound segment dies, such as the one shown, caused considerable stripping difficulties.

Rubber was used to strip the sheets from coil slot punches in segment dies. The dies are now made with spring strippers.

A 1¼" thick plate is counterbored at locations where stripping is most necessary. Holes are drilled thru the die shoe in line with the counterbored holes, and stripper pin holes are then drilled thru the shoe. When the plate is added to the die shoe, stripper pins and springs, with spring pads for the pins to rest on, are inserted in the holes.

This new design eliminates the labor involved in cutting the rubber and packing and repacking the die to get the right amount of rubber. Time is saved because it is not necessary to refit the die due to overpacking it with rubber. Also, die resets are eliminated.

By FRANK O'REILLY
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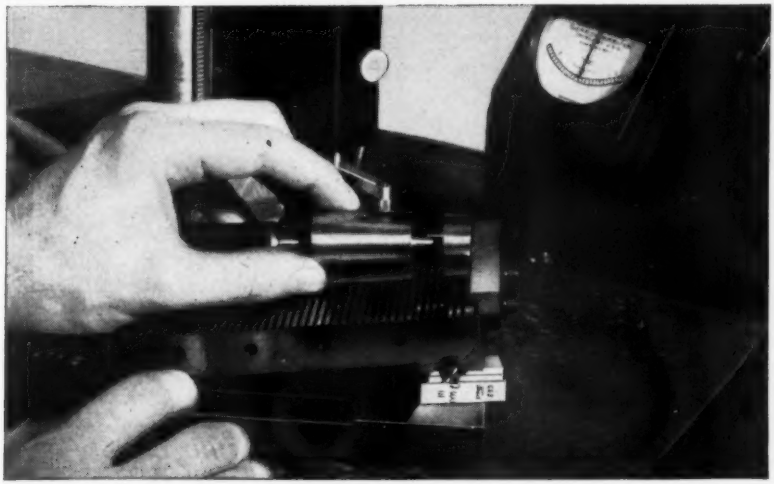

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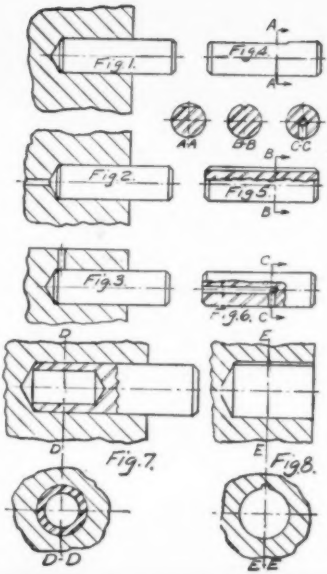
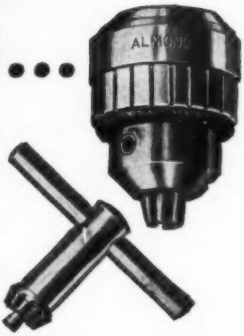
On machine, tool and jig and fixture drawings, pins are shown inserted in holes as illustrated in Fig. 1. The pin bottoms at the lower end of the hole with no provision made for the expulsion of air. It is a well known fact that as the pin is pressed into the hole, the air compresses, thereby making it impossible for the pin to reach the bottom of the hole. When the pin must protrude a specified amount especially when it acts as a stop, it is imperative that the end must be metal-to-metal to assure accuracy.

Probably the best method is to have a two size hole, the smaller of the two to be sufficiently large to accommodate a knock-out rod, but small enough to have a sufficiently wide shoulder against which the pin may rest. Otherwise the pin must be drilled out when repairs are necessary. Such assemblies are shown in the remaining illustrations. If this is deemed necessary, provision must be made to expel the air from the bottom of the hole.

In Fig. 2 a small hole at the end of the large hole is drilled. Sometimes the distance from the bottom of the hole to the nearest surface is too great. If the pin is close to a surface parallel with the hole



ALMOND...
Triple Jaw DRILL CHUCK



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Almond Chucks are furnished in nine sizes with capacities from 3/16 to 1". They are made for heavy and light duty types with taper or threaded arbor hole — to fit all machine tools and portable tools.

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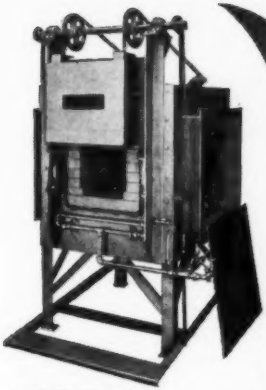
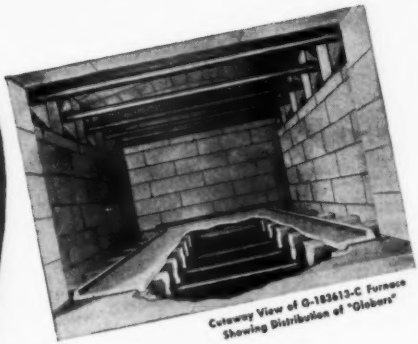


G-122412-CU "Globar" Box Furnace



Cutaway View of G-183613-C Furnace Showing Distribution of "Globars"

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axis, a small hole may be drilled as is shown in Fig. 3. If both the foregoing methods are impossible, the pin may be milled with a slight flat as shown in Fig. 4 with cross section of the end view AA. The flat has been shown purposely large. It need not extend further than the depth of the hole.

As shown in Fig. 5, a small vee-groove is milled along the edge, as at Section BB. This groove need be barely more than a deep scratch to produce good results. Burrs should be avoided. Of course the shape of the groove can be any that is desired for which a cutter is available. A hole is drilled axially in Fig. 6 connecting with a cross hole. The pin can be assembled with the cross hole at the bottom if so required. If not objectionable, the axial hole can be drilled clear thru, thereby eliminating the cross drilling. Section CC shows an end view.

For larger pins, the method shown in Fig. 7 and Section DD is frequently used. The end of the pin is drilled out. Here the air will not compress enough to be detrimental to proper seating. Fig. 8 shows still another method used when a vertical shaper is available. The groove is in the hole. Alternately, a small hole can be drilled at the periphery of the hole, being completed before the large hole is drilled and reamed.

It is assumed, of course, that the pins in the foregoing sketches are not heat treated.

By H. F. WILLIAMS

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Tenite is manufactured by Tennessee Eastman Corp., Kingsport, Tenn.

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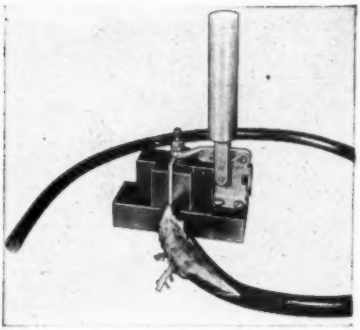

The tool illustrated is used to strip insulation from heavy cable.

A toggle clamp is fastened to a block which serves as the base of the tool. An adjustable knife is mounted in the upper block which slides up and down on two pins or shafts. The base is counterbored around the shafts to provide seats for the

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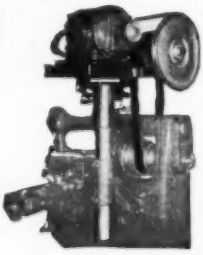

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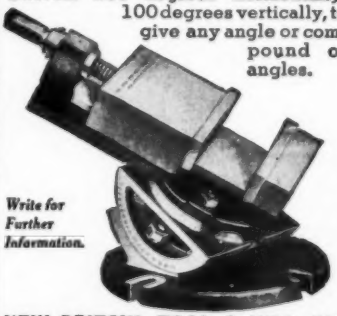

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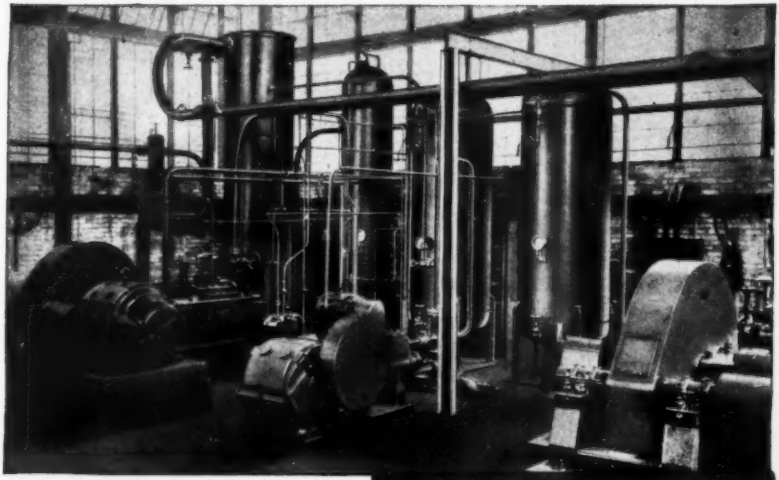

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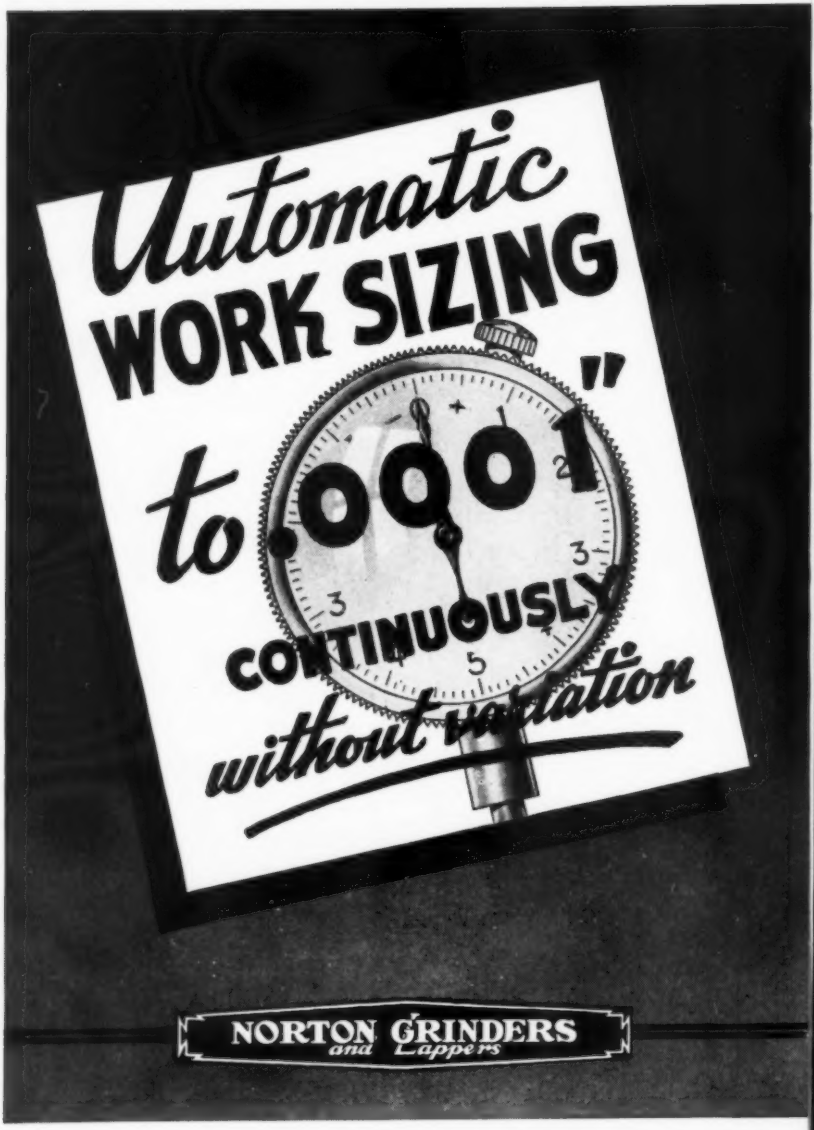
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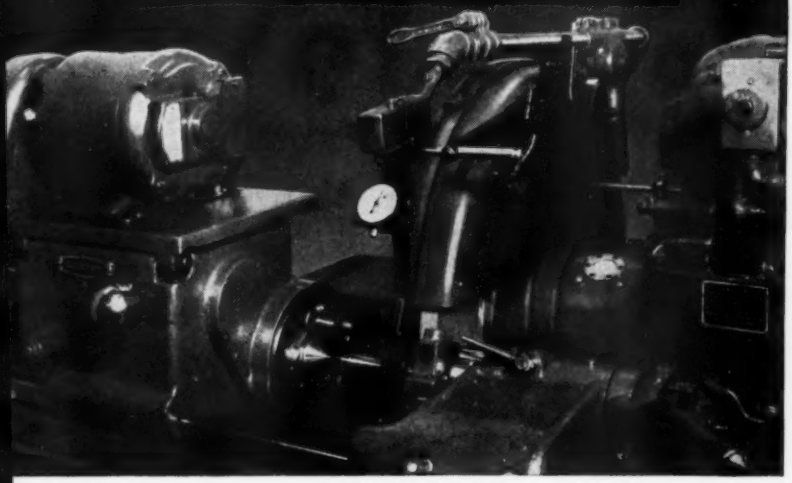

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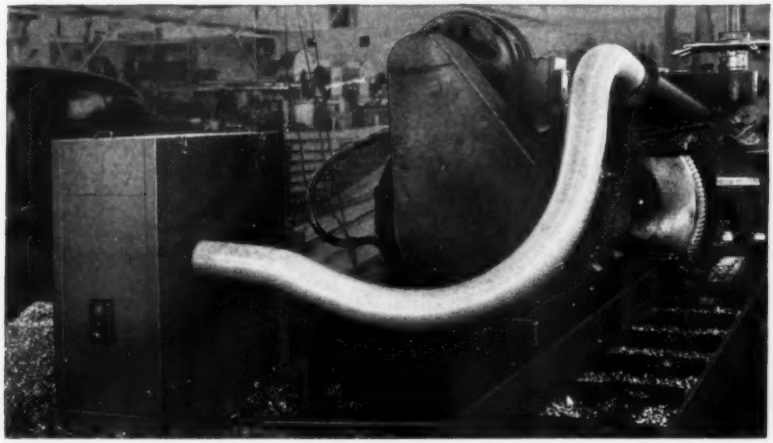

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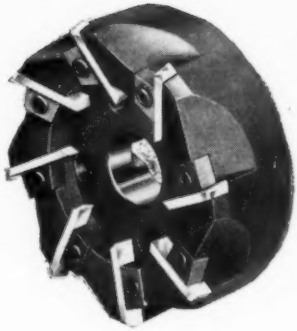
In operation the tool consistently produces well stripped cables with a minimum amount of time and effort. The simple design makes it easy to build in any shop.

By A. H. LANGLOIS
Industrial Electronics Division Westinghouse Electric Corp., Baltimore, Md.



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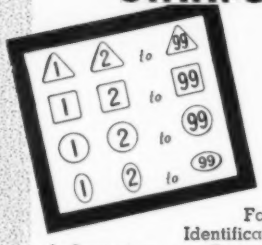

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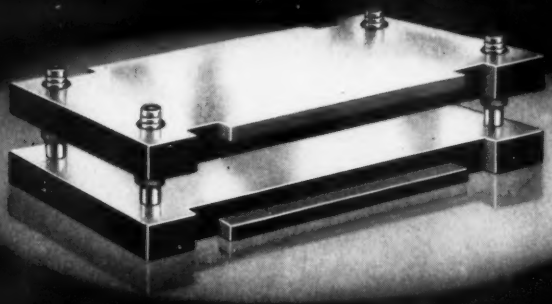

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DETROIT DIE SETS ★

for these are of the same cross section, and when shortened by regrinding, can be used in smaller cutters successively. They are "formed" at both ends, and can be used in either right or left hand cutters.

The Face Mill can be adapted for milling different materials simply by interchanging blades. Those having the proper grade of carbide and suitable cutting angles are selected and inserted.

Blades are wedged in the body at fixed angles, 15° dish, or concave 7° negative axial, and 15° positive radial. In this condition the cutter is suitable for milling light alloys. The effective radial rake is changed to 10° positive for cast iron, and 7° negative for steel, by grinding a narrow land on the working edge of the blade at the required angle. The true cutting angle in each case is, however, the resultant of axial, radial, and nose components, viz., 14° positive for light alloys, 8° positive for cast iron, and 8° negative for steel, which long experience has proved to be the most satisfactory.

These cutting angles, in combination with other design features, and the use of an exceptionally strong carbide in the blade, have, thruout exhaustive tests, produced unusually satisfactory results: —low power required to form and remove chips; high rate of metal removal; no coolant required, as the heat of cutting is is absorbed by the chips, while the work and cutter remain cool; good surface finish even on deep cuts and at heavy chip loads; unusually long cutter life; and greatly simplified maintenance requirements.

When the blades become dull they may be removed from the body, or tool holder, while it remains on the spindle, and sharpened on a standard surface grinder by a diamond wheel, while being held in a fixture, or grinding block, which is placed on the magnetic chuck in successive positions for accurate and uniform reshaping of the several cutting and clearance angles. This is a matter of minutes compared to hours required to resharpen cutters by the traditional method, on a standard cutter grinder.

Resetting of sharpened Kennamill blades by hand is equally simple. The operation is quickly performed and requires no special skill.

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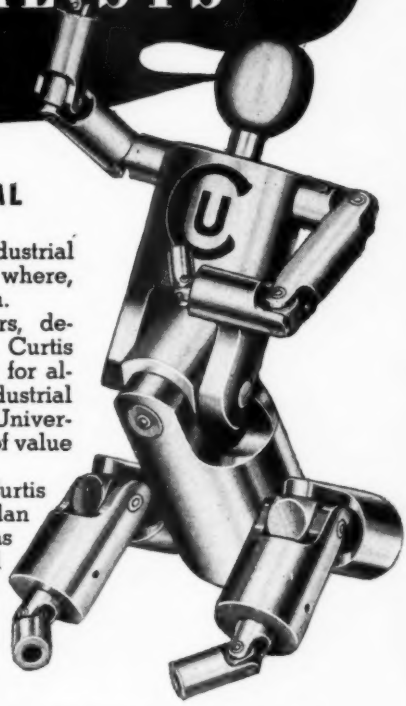

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piece to be milled, or in a block provided for the purpose. The remaining blades are each in turn placed in a slot, moved out to the shoulder of the flycut, at a new point on the milled arc, and securely wedged.

Because wedging components are finished to close tolerances on dimensions and angles, and blades are absolutely interchangeable, they can be accurately positioned to within a maximum run-out on the periphery of only a few thousands. In fact this slight run-out becomes an asset. One blade will inevitably be a thousandth or so higher on the face than any of the others, and it then acts as a clean-up to remove feed marks and produce a smooth finish.

Since the cutter body does not have to be removed from the machine, all handling and reassembling problems are greatly simplified, particularly for complicated setups. The effects of inevitable errors in spindle setups are annulled, because by hand setting blades the cutter is fitted to existing conditions.

MAKING INVENTORS TICK

What makes inventors tick?

Elias Howe, inventor of the sewing machine, said his motivation was the desire to make a million dollars. Hundreds of fathers of great brain children undoubtedly share that view.

Charles F. Kettering has said that inventors can no more resist inventing than poets can resist writing poetry.

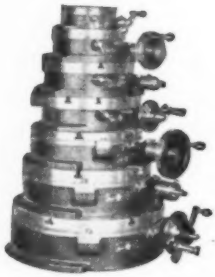
However, Dr. Joseph Rossman, in "The Psychology of the Inventor," says that in a study of 710 inventors he found altruistic reasons eighth in a series of ten motives most frequently mentioned. Only "laziness" listed by six, and confession of "I don't know" by 33 ranked lower. He found "love of inventing" listed by 193; "desire to improve," 189; and "financial gain," 167.

Dr. Rossman emphasizes that far greater risk and capital outlay are usually involved in commercialization of inventions than in their origin.

Henry Wallace and others who aggressively advocate forced sharing of inventions through compulsory licensing of patents have their eyes on compulsion, which is essential to any planned economy. This is not likely to make inventors tick, nor induce manufacturers to commercialize new developments.

Profit ranks high as an incentive, and the U. S. Patent System provides this incentive by granting the inventor an exclusive right to his invention for 17 years.

TROYKE ROTARY TABLES



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BENDER No. 2

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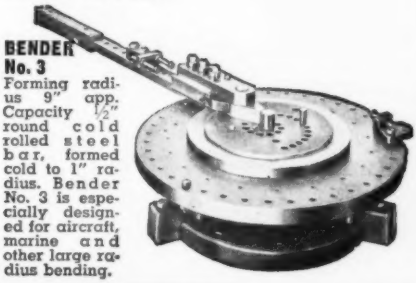

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DEBURRING BEARING RETAINERS

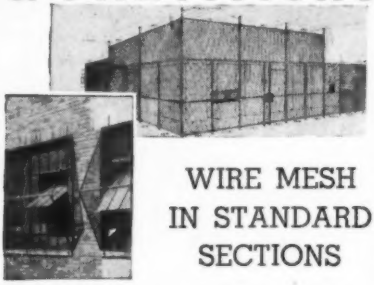
A new power brushing technique used in connection with the deburring and removal of sharp edges around drilled holes in malleable and bakelite ball bearing separators, is credited with speeding-up the operation 400 percent, according to a field report received from a New York manufacturer by The Osborn Mfg. Co., Cleveland.

The new method permits deburring several separators in one operation, and it does the work on both inside and outside diameters at the same time. On the malleable separators, the sharp edges are removed and the outside diameter and bore are deburred in a single operation while on the bakelite separators, the flashing is removed and the outside diameter and bore are deburred simultaneously.

These operations shown thru courtesy of The Marlin-Rockwell Corp., Jamestown, N. Y., were formerly accomplished by means of sandpaper and files. Now, for outside diameter work, Osborn 10" Monitor steel wire sections are used, equipped with .0095" wire and with 1¼" arbor holes, operating at a speed of 1800 rpm on a double spindle polishing lathe.

Four of these steel wire sections are mounted together for this part of the operation.

TOOL CRIBS & PARTITIONS



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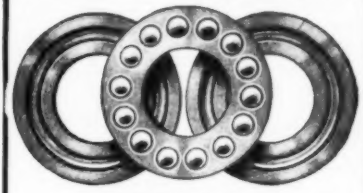

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The inside diameter operation is accomplished at the same time by using several Ringlock sections on a steel fixture. Rotation of the larger brush against the outside diameter spins the bore of the separators against the stationary Ringlock sections. The Ringlock sections are built up to width sufficient to accommodate two or more separators.

Three sizes of brushes are mounted together for the inside diameter operation, one ¾" with a ½" arbor hole and using .005" wire; another 1" in diameter, with a ¼" arbor hole and with .003" wire and the third, 2½" with a ½" arbor hole and using a .005" wire.

"DIE SLICK"

A new bulletin describes Die Slick, a lubricant for use on die casting dies and on the movable parts of permanent molds. It is being widely used by die casters.

A relatively new use for Die Slick involves its use as a lubricant on the cores, pinions, and other moving parts of permanent molds. Heretofore lubrication of these molds has proved quite a problem.

Copies of the bulletin from G. W. Smith & Sons, 116 So. Sperling Ave., Dayton 3, Ohio.

KEEP GEAR LUBRICANT CLEAN

Operating on the logical premise that there is a cause for every malady, last year Westinghouse Engineers ran to earth the reason for a most mysterious but also annoying local epidemic of excesive gear wear. As so often the case, the cause was a simple one. Fly ash or other abrasive dust was getting into the lubricating oil. That hard dirt particles in gear lubricant are not good is not a new idea, of course. But it had not been generally appreciated how little abrasive dust—fly ash, ore dust, or even log-bark dust—need be present for consequences to be serious. In one case, gears of a turbine-driven induced draft fan were wearing and becoming noisy in matter of days. Analysis of the lubricating oil indicated a small amount of fly ash. Applying adequate oil filters completely solved the trouble.

CARBIDE WAYS

Bearing surfaces of tungsten carbide against tungsten carbide—formed by installing carbide dovetail ways and wear strips in a grinder used at Carboloy Co., Inc., Detroit, Mich.—have materially re-

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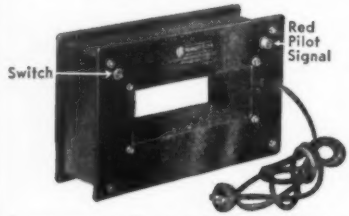

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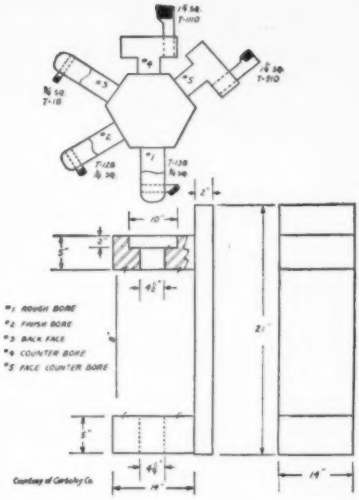
duced maintenance costs and also the down time previously required to maintain the machine in the "accurate" condition needed for grinding form tools with diamond wheels.

The cast iron ways and gib originally used on this machine had to be removed and scraped back to a plane surface once every six months under the severe grinding conditions imposed.

The Carboloy ways which were put into the machine consist of two upright dovetails, each about 9¾" x 1" x ½". Bearing directly against the dovetails are two Carboloy inserts—8½" x 1" x 3/16"—on one side of the head, plus a tapered carbide gib on the other. Thus, all bearing surfaces are of solid cemented carbide. These carbide ways have been in continuous use, two eight hour shifts per day, for more than seven months. No signs of wear have been detected as yet.

ABRASIVE IN CASTINGS

Use of a steel-cutting grade of Carboloy for the machining of castings which contain a large amount of silicon sand doubled the production on a particular operation in the shop of a Naval equipment supplier.



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The job consisted of rough boring, finish boring, back facing, counter boring, and face counter boring cast steel winch stands as shown. Due mainly to the numerous large deposits of extremely hard, abrasive silicon sand encountered by the tools during this particular machining operation, average production per 8 hour day was 7 to 8 pieces, when using high speed steel tools. Moreover, these tools produced only 2 pieces per grind.

The 5-tool set-up was re-tooled with Carboloy grade 78B cemented carbide—the grade generally used for practically all types of steel cutting, which combines toughness with good wear resistance. Feed on the 48" boring mill used for this operation was .032" and the depth of cut averaged 5/16". Production of the winch stands was more than doubled, rising to an average of 16 to 17 pieces per 8 hour shift. Approximately 10 parts were machined between tool grinds, or five times the number previously obtained.

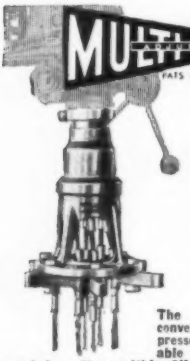
TURNING SMALL DIAMETERS

A specially made Empire live center fitted with a Jacobs chuck is offered as a solution to the problem of precision machining of small diameter work. The problem was to overcome the tendency of the work to buckle or "belly" in the middle under the thrust action of the center. To overcome this the special Empire live center is placed in the tailstock of the lathe. The small diameter work is then tightened into the Jacobs chuck. Instead of turning the tailstock wheel for thrust action, the wheel is turned in the opposite direction imparting a pulling action. Thus the work is held rigid and straight and the "bellying" eliminated. It is found that work of small diameter may be machined in this way with the precision of larger diameter work. It is made by Royal Products, 70 Spring St., New York 12, N. Y.

SIMPLIFYING FIT SPECIFICATIONS

When establishing limits and tolerances for the fit of a shaft or spindle in a bearing, confusion sometimes exists in the minds of the shop worker or draftsman as to how they should be calculated. The accompanying method is probably as simple and as readily understood as any.

Many shops have standardized tolerances as applied to hole sizes. Whether a reamer is used or the hole is finished by diamond or tungsten carbide boring,



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The MULTI-DRILL attaches conveniently to most ½" drill presses. Its six radially adjustable spindles are quickly set to any hole pattern within 5" circle—1" minimum centers. Standard capacity ⅜" to ⅝" drills. Modifications available for special applications.

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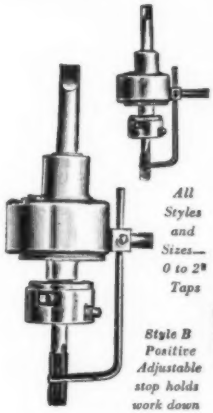

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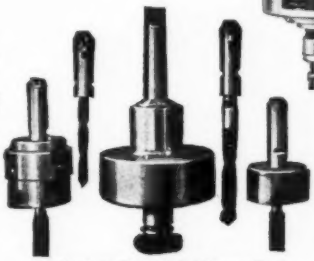
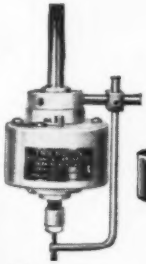
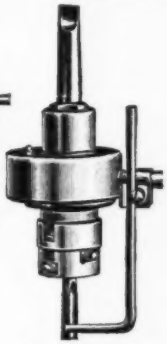


Style D-E, Quick Change Tools





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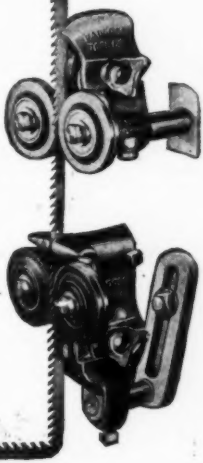

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BALL-BEARING

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grinding or honing, some tolerance has been set so that the limits fall within predetermined ranges. For small holes these limits are held closer than for larger holes.

To distinguish between limits and tolerances (terms which are very often misused, in that one is mistakenly applied for the other), these statements are simple and to the point. Limits are the minimum and maximum allowable dimensions to which a piece of work may be machined, such as the diameter of a shaft being given as 1.997 to 1.998". Many shops use such a system and ignore tolerances altogether, maintaining that the machinist does not have to make mental calculations as when tolerances are used.

Tolerances are those amounts greater or less than a specified dimension to which a piece of work may be machined; that is, the difference between the maximum and minimum allowable dimensions. For example, the shaft diameter already mentioned would be written as 1.998-.001". This has been expressed unilaterally in that the tolerance is one sided. The diameter also may be written as 1.9975±.0005". This is expressed bilaterally in that the tolerance is two sided or an equal amount above and below the given dimension. It is sometimes debated that this latter system, either unilateral or bilateral, is often the cause of spoiled work because the shop man neglects to read his decimal points correctly.

In the method hereafter described, a hypothetical list of limits have been assumed to make it readily understood. These limits have been kept in thousandths of inches rather than complicating the issue as when half, quarter or tenths of thousandths are specified.

Limits for a 2" diameter hole=
2.000" to 2.001"

Limits for a 2" diameter shaft are:
Rotating fit .....1.997" to 1.998"
Push fit .....1.999" to 2.000"
Press fit .....2.001" to 2.002"
Shrink fit .....2.003" to 2.004"

For rotating fit:
Largest hole dia.; smallest shaft dia.=
2.001"—1.997"=.004" loose.
Smallest hole dia.; largest shaft dia.=
2.000"—1.998"=.002" loose.

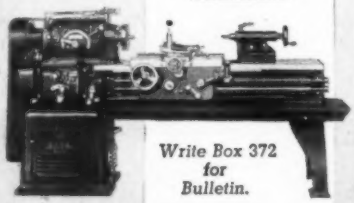
For push fit:
Largest hole dia.; smallest shaft dia.=
2.001"—1.999"=.002" loose.
Smallest hole dia.; largest shaft dia.=
2.000"—2.000"=.000" loose.

For press fit:

CARROLL AND JAMIESON LATHES
15" AND 16"

12 Speed Geared Head Motor Drive Timken Mounted Spindle.

Modern Design—Liberal Dimensions.



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THE CARROLL & JAMIESON MACHINE TOOL CO.
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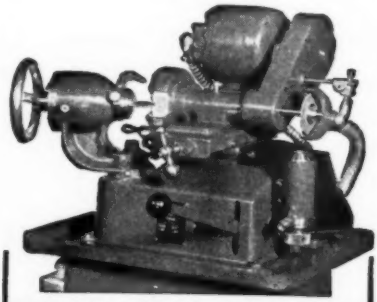

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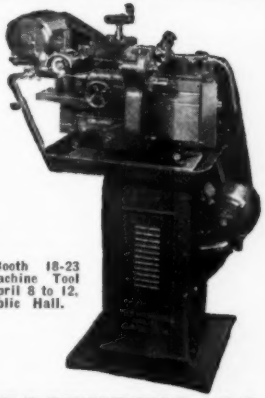

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By H. F. WILLIAMS

MILLING CUTTER CHART

A carbide milling cutter data calculating chart, believed to be the only one of its kind in existence, has just been compiled by Cooper-Bessemer.

The chart, particularly useful to machine operators and tool purchasers, is designed to facilitate the finding of cutter speeds, table feed and approximate hp for milling cutter operation by a quick glance at the chart's compilations.

For instance, to find cutter speed, it is only necessary to select the desired depth of cut on a scale located in lower left hand corner of chart. The line indicating this depth is followed until it intersects with desired cutter diameter and a horizontal line which crosses that intersection indicates the suggested cutter speed. Finding the table feed and approximate hp is equally simple.

The chart also may be applied to Cooper-Bessemer single point tools by determining data for a two-tooth cutter and dividing by two.

It was designed primarily to facilitate use of Cooper-Bessemer milling cutters which the company manufactures in addition to its regular line of Diesel, gas engines and compressors.

Extra copies of the chart (99-MC) are available in limited quantities by application to the Industrial Tool Division, The Cooper-Bessemer Corp., Dept. R, Mount Vernon, O.

HOW TO CUT CAST IRON

The Technical Service Department of National Cylinder Gas Co., 205 W. Wacker Drive, Chicago 6, Ill. has just issued an illustrated circular completely covering the "how to" on the cutting of cast iron with the oxy-acetylene flame. For many years cast iron cutting was considered almost impossible, but now with proper apparatus and technique the job can be done both successfully and economically.

Included is discussion of proper types of equipment, preheating conditions, cutting positions, need of adequate protective clothing, proper oxygen and acetylene pressures, etc.

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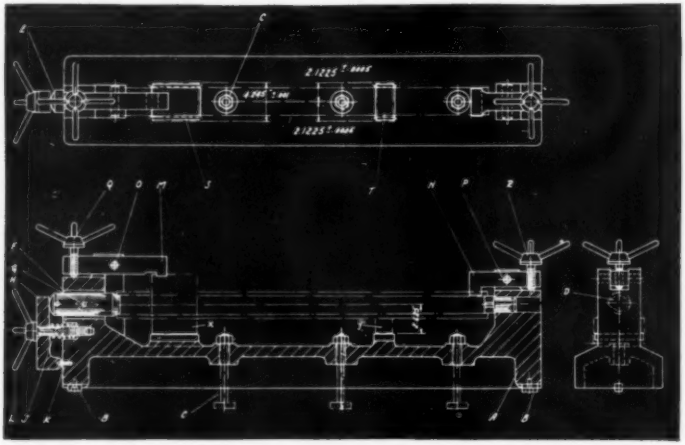
MILLING FIXTURE FOR INSTRUMENT BODY

Alex S. Arnott

A special fixture for straddle milling the feet of an instrument body is shown in the sketch. The instrument to be machined is a long narrow tube 3½″ in diameter and 30″ long, with two pieces (X) and (Y), welded to it. These are to be straddle milled to 4.245″ plus .001″ minus .001″, and this dimension must be held 2.1225″ plus or minus .0005″ from the center of the tube. Both ends of tube are chamfered to an angle of 30° and are machined accurately. Base of the feet have been ground to the dimension 2.625″ in a previous operation and these surfaces are utilized to align tube in the fixture.



To straddle mill the work to these dimensions, it was decided to hold the instrument body between two centers, align the feet on special blocks, and clamp the instrument into place with two sets of sturdy clamps, one to hold it lengthwise and the other to hold it down to prevent milling cutters from lifting it out of the fixture.

In referring to the view section A-A of the fixture, the body (A) has two keys (B) fitted in center at each end to align the fixture with keyways in the milling machine. The three bosses are spot faced and holes are provided to accommodate the three hold down bolts (C) which hold fixture to table. The casting is cored thruout the base to reduce weight and to assist in properly casting the body.

The diamond shaped center (D) is made from tool steel, accurately ground to fit snugly into chamfered end of the instrument tube and is press-fitted into bore in the end. The other center (F) is larger and has a taper to take up any discrepancy in dimensions on the work. The center is a sliding fit in bushing (F) which is a press fit in casting, and its movement is restricted by pin (G) which prevents it from moving too far forward or backward. Clamp (H) moves the center forward by action of the screw (L) which is threaded into casting and has the spring (J) to return clamp to normal position when not in use. The pin (K) prevents clamp from twisting around in a circle when pressure is released from screw. Screw (L) is designed with four convenient bar handles which are threaded at the ends to fasten them to the head of the screw.

Two clamps (M) and (N) hold work down and are pivoted on pins (O) and (P), and equipped with screws (Q) and (R). Both clamps are ground on faces in a "V" shape to suit contour of the work.

Tool steel blocks (S) and (T) are fastened to base with screws and dowels and are ground for accurate adjustment with surface of the feet. Both blocks are made .020″ smaller in width than the dimension 4.245″ and are used to set the straddle milling cutters with feeler gauges to correct dimension from center of tube.

When loading work in fixture, large

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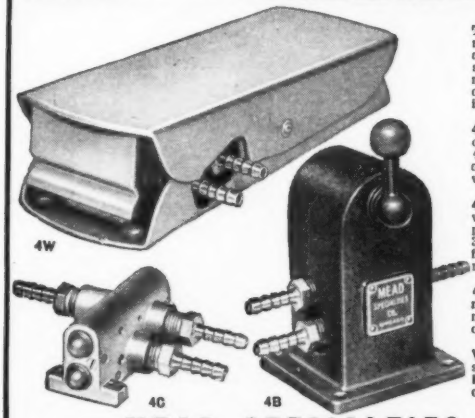

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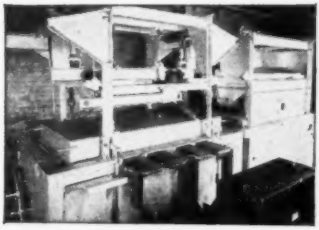

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end of the work is placed over tapered center (F) and moved in that direction sufficiently to allow other end of tube to be mounted on diamond shaped center at the opposite end. The end clamp is then operated to bring pin to bear on large end of tube, pushing the whole instrument forward and pressing it against center (D). The two feet are then aligned with the tool steel gauge blocks and the assistance of feelers to make the feet parallel along the base.

Upper clamps are then moved into position to hold work during the operation.

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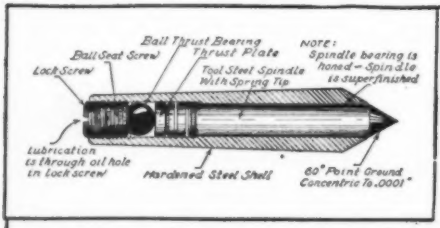

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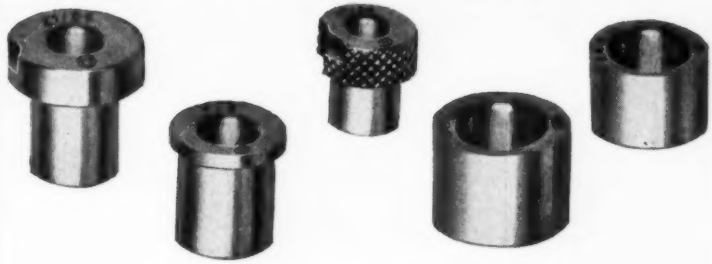

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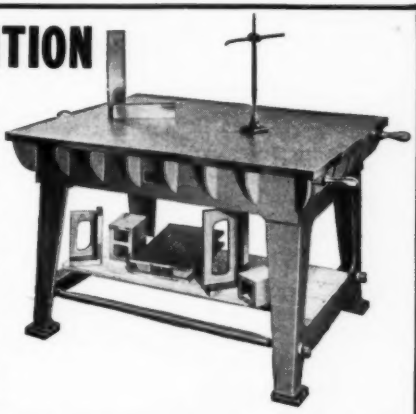

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Determining Four Gear Change Gear Ratios

By JOHN W. KING

THIS is the second in a series of two articles on this subject. The first one appeared in the January issue. In it I gave a method whereby it is possible to determine all possible solutions and approximations to a given change gear ratio; with a given number of change gears available. The example in the January article was built around the 13 change gears furnished as standard equipment with 6x36" Jones & Lamson Automatic Thread Grinders. With the method given, it is possible to specify change gears for any given ration accurately; using available gears; or only one or two gears in addition to those available.

In this article, a method is given which will be especially helpful to readers concerned with machine tools, which have complete, or nearly complete sets of change gears available. In a few minutes; using this method, a large number of combinations can be determined for any given ratio. With this method, every possible solution and approximation to a given change gear ratio could be determined, if so desired.

An advantage in having several combinations from which to choose; even tho a complete set of gears is available; is that gears in which the strain on all the teeth is as nearly equal as possible can be chosen. If the first driven gear has the same number of teeth as the second driver, then in theory, the strain on all the teeth of all four of the gears is identical. Therefore it is well to have the first driven gear as nearly as possible of the same size as the second driver, particularly if the four change gears are required to transmit any considerable load.

Like the method previously given, a table of decimal equivalents; and a table of factors are necessary. A table of decimal equivalents, and one of factors are both included in the book entitled, "14000 Gear Ratios" (Price $5.00 from the Industrial Press, 148 Lafayette St., New York, N. Y.) In addition to these tables; this excellent book on gearing problems, contains tables on, Total Teeth and Equivalent Ratios; and Decimals, Logarithms, and Gear Sizes. A calculating machine should be available when using the method, so that needless hand calculations will be avoided.

The method of determining change gear ratios employed in this article is

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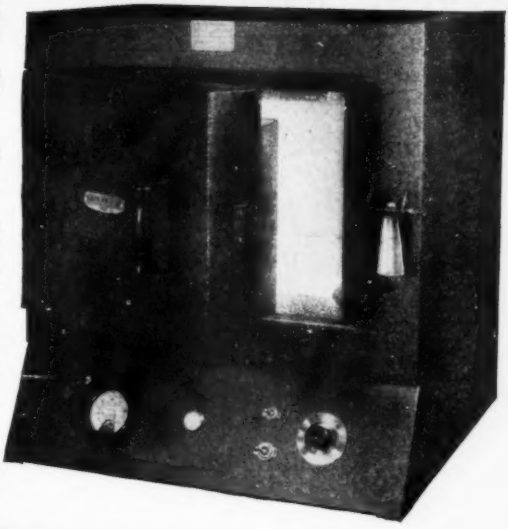

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ranging from approximately 1½c to 3c an hour with the smaller unit. Both models have visible built-in indicating pyrometers (calibrated in Centigrade and Fahrenheit) . . . automatic control devices . . . pilot lights . . . control switches. Well insulated and designed for years of service . . . elements can easily be replaced. Every plant needs one or more of these heat treating furnaces. Place your order now. Desirable territories open for a select group of distributors. Write today.

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based on the principle, that the value of a given fraction is not changed by subtracting proportional amounts from the numerator and denominator of a given fraction; or by adding proportional amounts to the numerator and denominator. That is:

$$1/3 = .333333333 = \frac{21}{63} = \frac{21 \text{ minus } 1}{63 \text{ minus } 3} = \frac{21 \text{ minus } 2}{63 \text{ minus } 6} = \frac{21 \text{ minus } 3}{63 \text{ minus } 9} = \frac{21 \text{ minus } 4}{63 \text{ minus } 12} = \frac{21 \text{ minus } 5}{63 \text{ minus } 15} = \frac{21 \text{ minus } 6, \text{ etc.}}{63 \text{ minus } 18}$$

Likewise;

$$1/3 = .333333333 = \frac{21}{63} = \frac{21 \text{ plus } 1}{63 \text{ plus } 3} = \frac{21 \text{ plus } 2}{63 \text{ plus } 6} = \frac{21 \text{ plus } 3}{63 \text{ plus } 9} = \frac{21 \text{ plus } 4}{63 \text{ plus } 12} = \frac{21 \text{ plus } 5}{63 \text{ plus } 15} = \frac{21 \text{ plus } 6, \text{ etc.}}{63 \text{ plus } 18}$$

EXAMPLE

As an example take any desired change gear ratio; say .393794. Referring to a table of decimal equivalents, we find the nearest fractional equivalent of this particular number to be, $\frac{13}{33}$ — which equals .393939.

We are interested in numbers large enough for a four gear combination, therefore multiplying by 200;

$$\frac{13 \times 200}{33 \times 200} = \frac{2600}{6600}$$

Dividing 6600 by 2600 we find the denominator approximately 2½ times as large as the numerator. Therefore if we decrease 2600 by one, it would be necessary to decrease 6600 by 2½ to have the ratio remain approximately the same.

Since .393939 is a bit larger than .393794; we will want to decrease the numerator (6600) somewhat less than 2.5 every time we reduce the numerator one. In this way the approximations determined will approach the desired ratio of .393794 instead of being slightly larger than .393939 which is already larger than .393794 which we intend to approximate.

Referring to a table of factors, we find that 2599 which is one less than 2600 is factorable (2599 = 23 x 113) and that the factors are of a size suitable for change gears. But that 6598 which is two less than 6600 is not factorable, so this particular pair of numbers is not suitable.

For the same reason; $\frac{2598}{6595}$ or $\frac{2598}{6596}$ are not suitable approximations; continuing down the tables, neither are, $\frac{2597}{6593}$ or $\frac{2596}{6591}$ or $\frac{2595}{6588}$ or $\frac{2594}{6586}$ or $\frac{2593}{6583}$.

But $\frac{2592}{6580}$ is because these numbers are factorable.

$$\frac{2592}{6580} = \frac{A}{B}\ \frac{48}{70} \times \frac{C}{D}\ \frac{54}{94} = .393919$$

This ratio, .393919 is less than .393939, but not near enough to the desired ratio of .393794 to be worthwhile.

Continuing, we find,

$$\frac{2585}{6565} = \frac{A}{B}\ \frac{47}{65} \times \frac{C}{D}\ \frac{55}{101} = .393754$$

$$\frac{2584}{6561} = \frac{A}{B}\ \frac{38}{81} \times \frac{C}{D}\ \frac{68}{81} = .393842$$

$$\frac{2583}{6560} = \frac{A}{B}\ \frac{41}{80} \times \frac{C}{D}\ \frac{63}{82} = .393750$$

$$\frac{2581}{6555} = \frac{A}{B}\ \frac{29}{69} \times \frac{C}{D}\ \frac{89}{95} = .3937452$$

$$\frac{2580}{6552} = \frac{A}{B}\ \frac{43}{78} \times \frac{C}{D}\ \frac{60}{84} = .393772$$

$$\frac{2575}{6540} = \frac{A}{B}\ \frac{25}{109} \times \frac{C}{D}\ \frac{103}{60} = .3937308$$

$$\frac{2574}{6536} = \frac{A}{B}\ \frac{39}{76} \times \frac{C}{D}\ \frac{66}{86} = .393818$$

$$\frac{2573}{6534} = \frac{A}{B}\ \frac{31}{66} \times \frac{C}{D}\ \frac{83}{99} = .393786$$

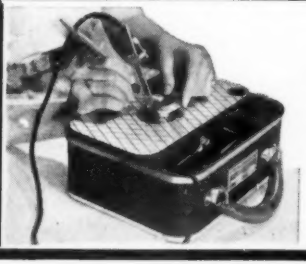
$$\frac{2560}{6500} = \frac{A}{B}\ \frac{40}{65} \times \frac{C}{D}\ \frac{64}{100} = .393846$$

$$\frac{2556}{6490} = \frac{A}{B}\ \frac{36}{59} \times \frac{C}{D}\ \frac{71}{110} = .393836$$

$$\frac{2555}{6489} = \frac{A}{B}\ \frac{35}{63} \times \frac{C}{D}\ \frac{73}{103} = .393743$$

From the foregoing example; it is evident, that with the aid of a calculating machine; several extremely close approximations for a given change gear ratio can be determined in a few minutes.

It is also possible to determine a series of approximations just as easily by adding proportional amounts to both the numerator and denominator of a given fraction.



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MONARCH'S NEW "UNI-MATIC"

A NEW turning machine, the Uni-Matic, radically different in design from the usual engine lathe, is announced by the Monarch Machine Tool Co., Sidney, Ohio, for performing turning, facing, and boring operations on a production basis with extreme accuracy.

The new machine consists essentially of two members (1) a simplified version of the conventional lathe base and headstock, with change gears, motor, and associated drive mechanism, and (2) from one to three specially designed individually motor-driven tool slides, mounted on Tee-slotted swiveling bases, permitting turning, facing, and boring operations from almost any angle.

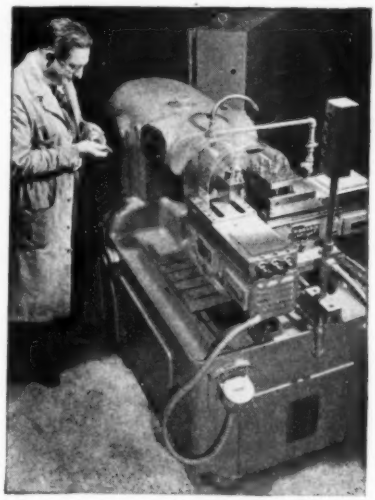
These tool slides, known as "Uni-Mats", are basically individual motor-driven compound rests which can be grouped about spindle in whatever arrangement facilitates application of cutting tools to the work.

Each "Uni-Mat" is equipped with an electrically controlled a-c motor which will traverse main slide of the device at 100" per minute until automatically slowed to a predetermined feeding rate for remaining part of its total 4" travel. At end of feeding cycle, it can immediately revert to 100" per minute rapid traverse return or dwell a given number of seconds before returning to starting point.

Three adjustable micrometer stops at end of "Uni-Mat" control the feeding, and traversing elements of the cycle. That portion of the automatic cycle concerned with rate of feed is controlled on a single purpose "Uni-Mat" by sets of change gears which make it possible to obtain from ½" per minute to 13" per minute feed.

"Uni-Mat" is also furnished driven by a d-c motor so that with two sets of change gears, it is possible to obtain the entire feeding range from ½" to 13" per minute thru variation in speed of motor and change of feed gearing.

When driven by a d-c motor, top speed of that motor also creates a rapid traverse motion of 100" per minute. Feeding rate is then controlled entirely by a lower speed of the motor which is electronically controlled.



The slides, regardless of their type of initial drive, are built in two models, one equipped with tool relief, the other with a solid top slide. The one equipped with tool relief is so designed that the tool relief slide and the regular top slide will

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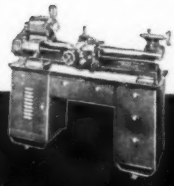
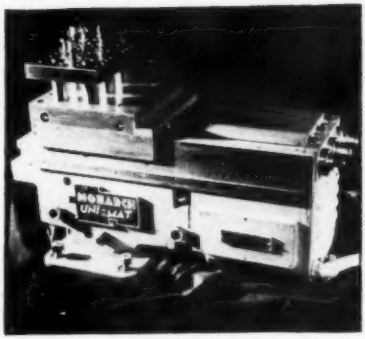


SHELDON MACHINE CO., INC.
4242 N. Knox Ave., Chicago 41, U.S.A.

traverse at 100" per minute. However, just as soon as it starts its cycle the tool will move .031" closer to work. By a slight internal adjustment the tool relief can operate in either direction, with reference to longitudinal or feeding direction of the slide, adapting it for turning, facing and boring operations. Just as soon as the "Uni-Mat" slide has completed the feeding portion of its cycle and is at end of dwell (if used), the tool relief again functions, taking tool away from work .031" as rapid traverse takes slide back to starting point.

The only connection between the one or more "Uni-Mats" with which the new "Uni-Matic" is equipped, is the cable which carries the control circuits. Electronic equipment is in a separate control cabinet, so designed that all wiring, relays and other electrical equipment are readily accessible for maintenance inspection. All devices are of standard design with several hundred per cent overload capacity. In almost every case, multiple contacts are used minimizing chances of failure to function.

Since the only connection between the "Uni-Mat" slide, which moves tool thru the automatic cycle, is this one cable, it is possible to position each unit in exact accordance with the work. The only moving slide is directly below cutting tool and the micro switches which control functioning of this automatic cycle of the slide are mounted in a direct one-to-one relation to motion of tool slide. An accuracy of duplication within, plus or minus, only a few tenths of a thousandth of an inch is said to be entirely possible.



"Uni-Mats" can be positioned for work 1" to 12" or 16" in diameter, with suit-

SPRING PRESSES

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Power and Foot Operated...

TAYLOR & FENN Spring Presses are used for Riveting, Staking, Stamping and similar operations on small, light parts. They are constructed to compensate for variation in thickness of the work and to deliver repeatedly a **UNIFORM BLOW.**

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Vertical Millers
Duplex Spline Millers
Medium Duty and High Speed Sensitive Drilling Machines

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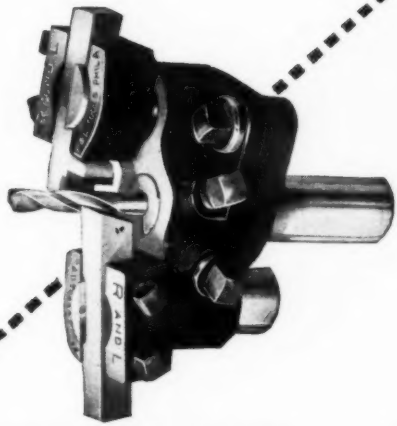
HARTFORD, CONN. U. S. A.

R and L RIGHT--> to



<--LEFT in 10 Seconds...

with R and L Turning TOOLS

Production savings are important in post-war work. Here is a tool that will save time and money in your shop.

R and L tools increase production by reducing set-up time, by speeding cutting operations, by doing right and left hand turning and by performing several operations simultaneously.

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1. "Proven Performance" say many users who have already installed this modern method of protection for precision, carbide tools, gages and spare parts.
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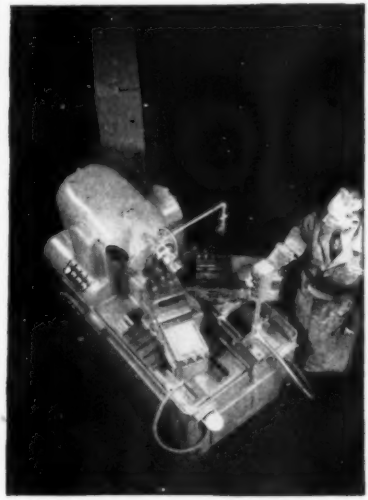
NEW ENGLAND REPRESENTATIVES—
Arthur A. Crafts Co., Inc.
603 Newbury St., Boston, Mass.

able tool support on all diameters. Every time a "Uni-Mat" slide is moved from one position to another, the supporting slide moves right with it, making it possible to take the same chip in section on a large or a small diameter.

Since the "Uni-Mats" are all electrically controlled, several timing devices have been utilized to maintain any required relation between the cycle of one "Uni-Mat", the cycle of a second and a third. After the micro switches have been positioned to control the cycle, it is possible to re-time the slides with reference to each other so there will be no lost time between functioning of individual "Uni-Mats". This close timing is made possible not by shifting of cams, tools or stops, but merely by changing of the electrically-interlocked timers.



Viewed from above, this new Uni-Matic lathe is shown with two tool slides, known as Uni-Mats. These units are basically individual motor-driven compound rests which can be grouped about the spindle in whatever arrangement will best facilitate application of the cutting tools to the work.

Main drive spindle has been so designed that the several ball bearings at front and rear can be properly adjusted on the bench and retain this adjustment and when inserted into headstock housing.

Directly behind front spindle bearing is a gear attached permanently to spindle thru which final drive to spindle is created. This final drive gear can be of one of three sizes:—first, one of very large diameter for low speed high torque operations; second, one of medium size for medium speed and medium torque operations, and third, a smaller gear for high speed and low torque requirements. Since this change of ratio is in final drive, three different spindle speed ranges are made available from the one motor.

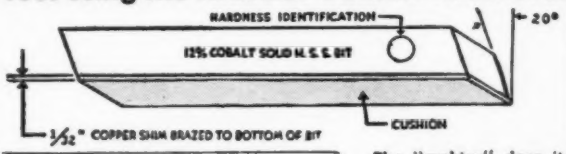
One spindle speed range has a top of 1000 rpm. This, of course, is for low speed, high torque operations. The second range is with a top speed of 2000 rpm for medium speed, medium torque operations. With the smaller gear, a top speed of 3000 rpm is provided for high speed, low torque operations. Still higher speeds can be furnished but those, up to 5000 rpm must be especially engineered for each requirements. Lubrication of main drive is provided either by means of a pump or atomizing, depending on operating speeds.

Remainder of mechanism thru headstock or main drive to spindle remains the same except for a series of change gears which can be used with an a-c motor to obtain varying speeds below top spindle range.

When the a-c motor is plugged, spindle will stop in slightly over one second if it is operating at 3000 rpm. Similarly, when main drive motor is started and directly connected thru the mechanism to spindle, the latter will reach 3000 rpm in slightly over one second. This makes it possible for small operations to be performed with extreme efficiency.

While specifically designed for single-purpose large quantity production, the "Uni-Matic" can be applied, with slight alterations in electrical control, to smaller quantity production and still give maximum output with relation to any other type of turning, facing or boring equipment. Using a d-c motor for main drive, spindle speed can be controlled quickly thru a rheostat or potentiometer, for changing from one type of work to another. At the same time, individual Uni-Mats can be driven by d-c motors so they can give exactly the speed required to produce the part. This eliminates almost entirely any change gears which might be required with the a-c design. It also permits a reduction in time required to set up for a production job, but at the same time retains all of the characteristics which give maximum production.

Now—for the first time—a real GENERAL PURPOSE tool using the HIGHEST COBALT HIGH SPEED Steel . . .



65-68 Rockwell C Hard

PRICE LIST

Cushioned Solid 12% Cobalt H.S.S. Tool Bits			In lots of		
Size of Bit			1-9	10-49	50+
¼	¼	2½	$ .60	$ .55	$ .50
5/16	5/16	2½	.80	.75	.70
⅜	⅜	3	1.05	1.00	.95
7/16	7/16	3½	1.45	1.40	1.35
½	½	4	2.00	1.95	1.90
⅝	⅝	4½	3.10	3.05	3.00
¾	¾	5	4.60	4.50	4.40
⅞	⅞	6	7.20	7.10	7.00
1	1	7	10.20	10.10	10.00

The "cushion" does it—you get the extreme Rockwell and RED HARNESS of 12% Cobalt H.S.S., plus an EFFECTIVE TOUGHNESS heretofore unobtainable with High Speed Steel Tools.
Gives production increases of from 20% to 200% through increases in speed and feed.
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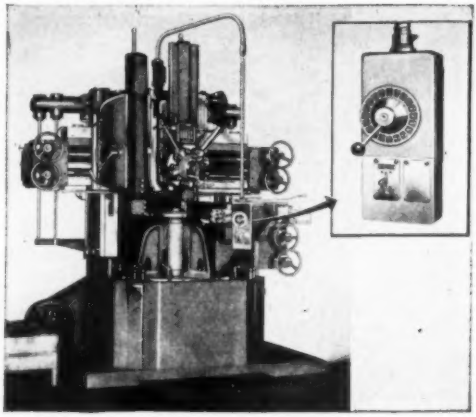


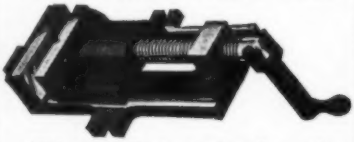
An outstanding and exclusive feature of all Bullard Cut Master Vertical Turret Lathes (the 30" to 74" sizes) is the Pendant Control, which provides a high degree of control and operating efficiency.

A swinging arm carrying the pendant is mounted on top of the machine high enough to permit full clearance of vertical heads when they are in maximum high position. The pendant is located at a convenient operating height.

The arm may be swung from the right side of the machine to any convenient point over to the left side of the machine, thereby giving full operating control at all times. The design is said to be a departure from conventional controls of this type, inasmuch as speeds are selected very rapidly by means of dialing.

When the machine is in operation and a speed change is desired, the switch lever is thrown into brake position, the change of speed quickly dialed and the lever

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

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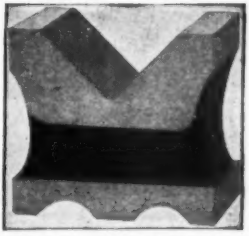

Why Not Save Time—by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from 3½ to 10", in three styles. Each block is carefully machined on all sides, with close limits held within .001" where required. A machined ledge on both sides provides for clamping on machine bed.

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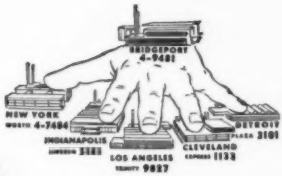

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Full line of Producto Dowel Pins and other Die Makers' accessories are at all times in stock at these plants and also at Sales Offices in Buffalo, Syracuse, Philadelphia and Dayton.

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There are many cases which require jogging of the table for positioning and indicating purpose. This is very easily accomplished thru the use of the switch lever which will jog position the table for any fraction of a revolution.

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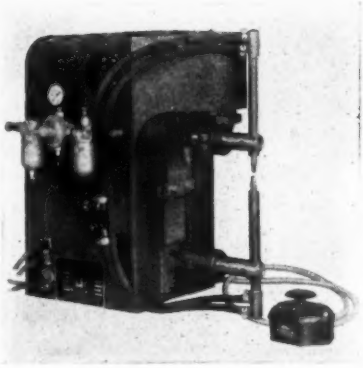
Added to the Universal line of 1 KVA and 3 KVA Air Operated Midget Bench Type Spot Welders is Universal USP-7½. Like the USP-1 and USP-3, it is a plug-in type and includes solenoid valve control of air cylinder, pressure switch and can be furnished with built-in NEMA IA electronic timer.

It can also be furnished with NEMA 3 B or 5 B in separate timer panel. The solenoid valve control of air cylinder by adjustable pressure switch provides a wide range of uses for welding non-ferrous metals, wire, jewelry and it will weld two pieces of 16 gauge steel. The 7½ KVA is equipped with air filter, pressure gauge and automatic lubricator. Initiation of welding cycle is by electric foot switch and it is equipped with water cooled transformer and electrodes. For bulletin and further information write to Davis & Murphy, Davis Bldg., 5252 Broadway, Chicago 40, Ill.



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No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

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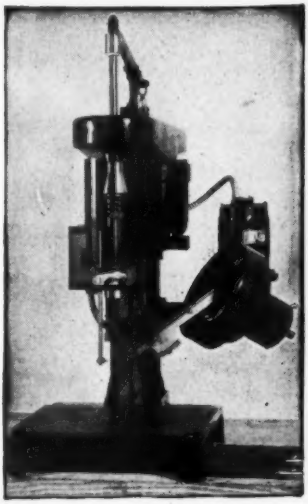

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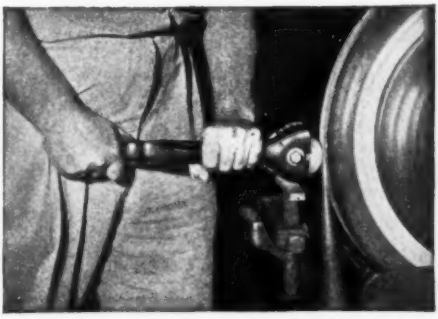
DESMOND GRINDING WHEEL DRESSERS



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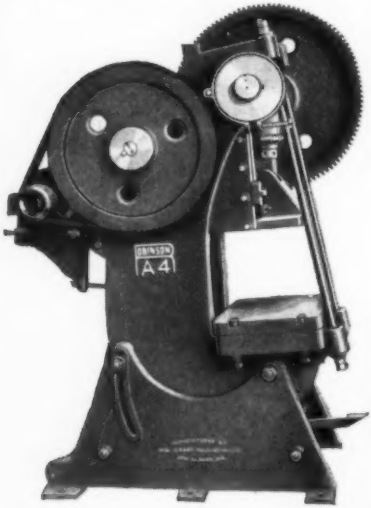

● The new improved Series A Robinson Punch Presses retain all the sturdy characteristics of their predecessors with added safety, speed, strength and ease of operation and maintenance. Available in five sizes.

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New Albany Machine Mfg. Co.
New Albany, Indiana, U.S.A.

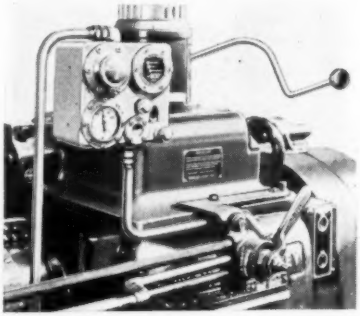
ROBINSON
Inclinable
PUNCH PRESSES

LOGAN R-F-L UNIT

This unit is a new development of the Logansport Machine Co., Inc., 903 Center Ave., Logansport, Ind.

In a compact casting measuring only 6″ square by 4¾″ deep, the R-F-L Unit incorporates all components of the awkward "Christmas tree" assembly of reducing valve, pressure gauge, filter and lubricating device. All connections are built into the casting, thus eliminating piping and the resultant pipe friction. All components are controlled from or visible on the front panel. The unit is mounted in the air intake line from the main air line, and is adapted to location on a central control panel.

It is equally effective when used with old or new air equipment. It can be incorporated in air devices on the market, in addition to its many uses in manufacturing and processing plants.



In operation, the new unit levels out surges and sudden drops in the air supply, and keeps the working pressure uniform with minimum air consumption. It

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filters air to separate rust, scale, other foreign matter and water, and lubricates working parts of air equipment by automatically injecting a continuous oil mist into the air supply.

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Control of the bellows-type reducing valve has long travel, permitting accurate adjustment to the required air pressure.

A replaceable porous metal filter traps moisture and foreign matter, supplying only clean, dry air to the air system. The filter is easily removed for cleaning. Moisture drips from filter into a water reservoir which requires draining only once or twice a week. "O" ring construction of the drain valve assures leak-proof operation.

The Lubricator automatically meters required amount of oil into air supply. By means of a convenient knob on the front panel, the metering needle is easily adjustable to a wide range of oil flow for varying work requirements. Sight glass in the front panel shows the oil level in the reservoir.

The unit is designed for working pressures to 150 psi.

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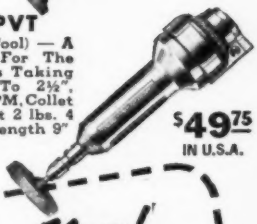

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NEW HORIZONS

By DAVID T. ARMSTRONG

ANY foreman who seeks to understand the fundamental entities of modern industry, to comprehend what it is accomplishing today, or to envision what progress it is likely to make tomorrow, must remember that the prime secret of successful enterprise is **men!** Visitors to manufacturing establishments are invariably more intrigued by the fascinating apparatus than by the men who are operating the machines. The machine is a non-material entity; it cannot think; it cannot make allowances for error; it cannot invent or discover anything; it has never brought a new concept into this world. But the machine is only as good as the men who use it.

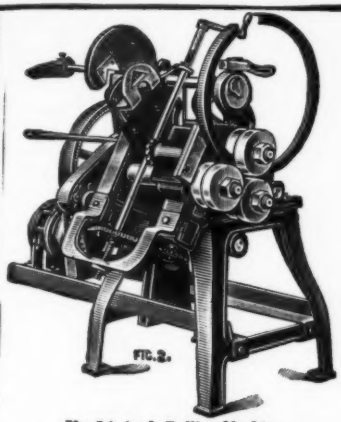
What kind of men do you meet in the ordinary plant. They look and live like the men you meet anywhere. They bowl, they drink a little; they argue about religion, politics, government; they read books and popular digest magazines; they gossip and listen to the radio. For the most part they are interested in the same things in which other people are interested. These are the individuals in whom the foreman must whip up enthusiasm to be dissatisfied with things as they are and to strive continually to make them better.

No real foreman can be satisfied with things as they are. Inevitably there will be changes. It is the job of the foreman to make sure those changes are for the better. The fundamental urge that should move him is a desire to improve existing things, to make them serve their purposes better, to discover methods of doing things which will make life pleasanter and easier in the plant.

With respect to the new and novel and seemingly impossible demands made by management, a good foreman never says—"It can't be done!" His experience with methods and materials and the great possibilities inherent in a corps of loyal conscientious fellow workers, have taught him to say, "Well, it hasn't been done yet, but we'll try to do it."

One of the hardest things to understand about the foreman's job is that it is never ended. There is always something more to do. For the alert and thinking individual, the solution to one problem suggests a whole series of questions which sets his mind planning ways and means to attack long-standing problems not yet properly solved. Such a foreman has little time or sympathy with those dreary pessimists who cry out loud and lamentingly that all the fundamentals have been mastered; that we have reached the apex of possible achievement; that the future holds forth little but a prospect of refinement of what we are already doing. That he brands as false. There are too many problems surrounding him which he is eager to tackle for the challenge they present to the principle of **laissez faire**, or the gospel of things as they are.

As a general rule, and this is important, he does things from day-to-day that do not seem to be significant; it is only when he achieves the objective in view, at the end of a year, or even five years, that it is possible to realize the tremendous progress that genuinely has been made. Therefore, he works ever with an eye to the future, constantly pressing on toward new horizons for methods and processes that will make better manufacturing conditions for the large number of men who work with him, and for the increasing number of consumers who benefit by the better living made available by his efforts.



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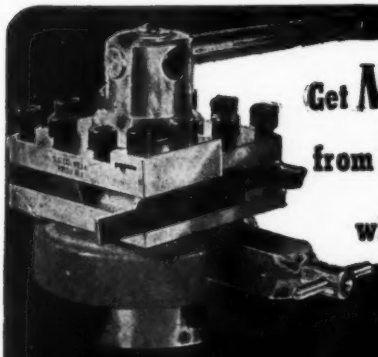
EXCELSIOR TOOL & MACHINE CO. EAST ST. LOUIS, ILLINOIS



Get **More Production** from the **Same Lathe...** with *Colwell Turrets*

★Positive Indexing
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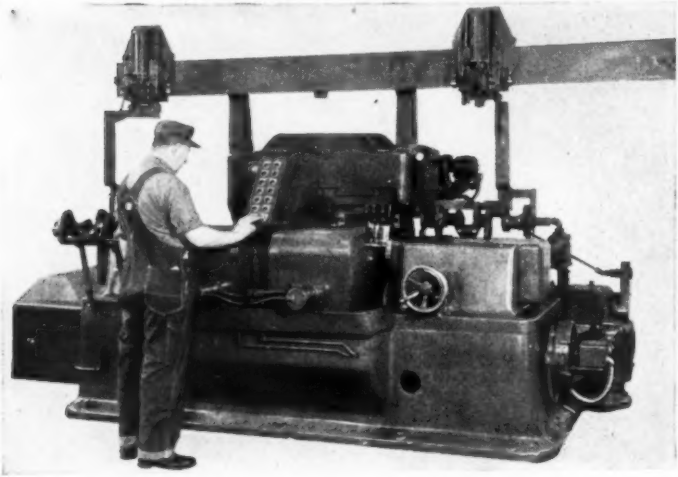
★4 Tool Changes
★Sizes for All Lathes
★Sturdy Construction

Specify the Turret with the Built-In Cutting-Off Tool

S. G. COLWELL 25 Congress Ave. Prov. R. I.

WICKES CH-4 CRANKSHAFT LATHE



A Combination Model CH-4 Automatic Rough and Finish Turning Center Drive type Crankshaft Lathe has been developed by Wickes Bros., Saginaw, Mich. It is designed for all turning prior to hardening or finish grinding on all main line bearings and ends of automotive and similar crankshafts where production is high.

The machine is equipped with hydraulic feed and is completely automatic in operation, rough turning the main line bearings first with divided tools both front and rear and then automatically shifting the finishing tools into position and finish turning complete with divided tools both front and rear. One operation of chucking, locating and handling of the crankshaft is therefore eliminated.

Power operated loading and unloading device is provided. Machine is also equipped with synchronized variable speed and feed mechanism to maintain both the surface speed and tool feed at the maximum permissible thruout the entire cycle. The makers emphasize that the machine is extremely rigid resulting in accuracy and incorporates other latest features for convenience in loading, chucking, etc. The weight with electrical equipment is approximately 30,000 pounds.

DIAMOND ACME TOOLS

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL CO.

15 MAIDEN LANE, NEW YORK, N. Y.

AUTOMATIC SAW OPERATION

Saw-Matic, a newly developed attachment that converts manually operated metal cut-off saws to full automatic operation is offered by Machine Specialties, 4029 N. Kedzie Ave., Chicago 18, Ill.

Sold as a complete package unit, ready for installation by workers in the purchaser's shop in a few hours' time, it consists of (1) Pull-up device (2) Vise clamp mechanism (3) Saw lifting and lowering device (4) Super-sensitive length control valve of special design. The unit will cut any length from 3/16" up, automatically, and will saw without an attendant. Consistency in length of cut to .010" is claimed by reason of a special friction pull-up device and an especially sensitive valve, so that the last piece sawed is the same length as the first on production runs.

A special unit is being built to fit each make of the more widely used metal cut-off saws.

The change from automatic to manual saw operation can be made simply by turning the hand valve on the air line. The automatic attachment will operate from as little as 60 lbs pressure.

IMMEDIATE ACCEPTANCE

STAR DUST

LAPPING COMPOUND

WINS ITS SPURS AS A PRECISION TWIN

NOW YOU MAY SOLVE ALL YOUR LAPPING PROBLEMS WITH

THESE TWO TWINS

STAR DUST DIAMOND POWDER

One of the outstanding abrasive accomplishments of the war. Exclusive crushing and laboratory grading methods make STAR DUST the most accurately graded abrasive ever produced. Available in all grit sizes and as fine as .0001, far beyond the smallest "mesh" heretofore produced by conventional processes. Must not be confused with so called "diamond dust".

STAR DUST LAPPING COMPOUND

Every tube is ready to use as delivered. Each tube contains the most efficient density of STAR DUST diamond particles for each grit size. "Opthalmic" tube with extremely fine nozzle delivers minimum compound required. No Waste. No contamination. Easy to apply. Easy to clean up. Surface finish of less than half a micro inch is easy. Indispensible for Carbide Tools.

WRITE FOR DETAILS

The POWDER dry —in vials— for mixing with your own carrier

ACE ABRASIVE LABORATORIES
1 SPRUCE STREET • NEW YORK 7, N. Y.

The COMPOUND —in tubes— ready-mixed for convenience

Accurate Spacing—

by the Thousandths

De-Sta-Co Arbor Spacers

Save time in setting up milling machine cutters, and wherever accurate spacing must be obtained and *maintained.*

Made of metal. Not only for greater accuracy, but also because they will not be affected by heat or oil. And can be used over and over. Standard sizes from .001″ to .125″. Specials, cut from bar stock, in any length and ground to decimal.

Order a set of De-Sta-Co Spacers from your Mill Supply Distributor today.

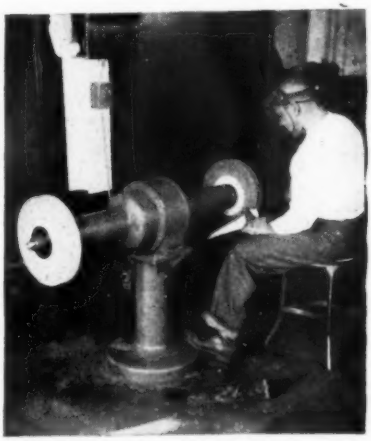
DETROIT STAMPING CO.

Established Over 30 Years

347 Midland Ave • Detroit 3, Mich.

BLACKSMITH BUFFER—GRINDER

A low pedestal type buffer and grinder has been designed by Hobart Bros. Co., Troy, Ohio., especially for use in blacksmith shops for the grinding and buffing of plow shares, and other long, odd-shaped pieces. It is also adaptable to a wide variety of other shops.



There is over 40″ working space between wheels and the low design of pedestal enables worker to sit at the work and brace work piece between his protected knee and the buffing wheel, assuring enough pressure against buffing wheel to produce a very smooth finish.

These grinders are fabricated from steel sheets rolled and electrically welded, insuring light weight yet sturdy construction. The ball bearings and smooth operating, long-life motor are fully enclosed. The strong, durable shaft and motor are accurately balanced and ride on three heavy duty ball bearings with a minimum of vibration.

The 3 hp motors are repulsion-induction if single phase, or squirrel cage induction if three phase. They use current only in proportion to load and are of non-stalling type that will not slow down under rated load. They operate at 1750 rpm.

Starting switch is conveniently located on pedestal, just under motor where it is within easy reach of operators hand or knee.

PIN-POINT-ADJUSTMENT NUT

A new 60 station adjustment nut, manufactured by the E. S. Firestone Engineering Co., 11127 Magnolia Blvd., North Hollywood, Cal., permits precision setting thru the utilization of mating serations which permit the nut to be set at exact tension and locked in position by a conventional cotter-key.

Pin-Point-Adjustment permits micrometer settings to as low as .001" take-up on 16-pitch threads with considerably finer adjustment possible on threads with increased pitch.

It is especially adaptable to securing proper spindle bearing adjustment to eliminate wheel wobble and achieve correct wheel alignment.

The Pin-Point-Adjustment Nut is especially suitable for Airplane Wing Bolts, Transmissions, Drive Shafts, Instruments and all high precision machinery where fine adjustments are required.

SUTTON COLLET BOOKLET

Sutton Collets are described and illustrated in a new booklet just published by the Sutton Tool Co., Sturgis, Mich.

In addition to showing standard drawin and push-out collets, the booklet also lists the new Full-Floating Collet with interchangeable and replaceable jaws developed especially for handling hot-rolled stock.

The diamond serrated principle is likewise described with drawings to show the advantages of diamond serrations in gripping action, reduced spoilage and easier handling.

MANY USES— BIG SAVINGS WITH CERRO

LOW TEMPERATURE MELTING ALLOYS

CERROMATRIX—250° F. For securing punch and die parts; anchoring machine parts; short run forming dies, etc.

CERROBEND—158° F. As a filler for bending thin-walled tubing—melts out in boiling water. Also used for automotive and aircraft assembly jigs, forming dies, etc.

CERROSAFE—165° F. - 190° F. Used for proof-casting cavities in molds, forging dies, duplicate patterns, etc.

CERROBASE—255° F. Used in electroforming dies, molds, etc.

CERROTRU—281° F. Metal molds for wax patterns used to make precision castings.

CERROLOW — 117° F. — **CERROLOW** — 136° F. and **CERROLOW** — 174° F.

REPRESENTATIVES AND DISTRIBUTORS

Brooklyn, N. Y., Belmont Smelting and Refining Works
Ansonia, Conn., Jackson Associates
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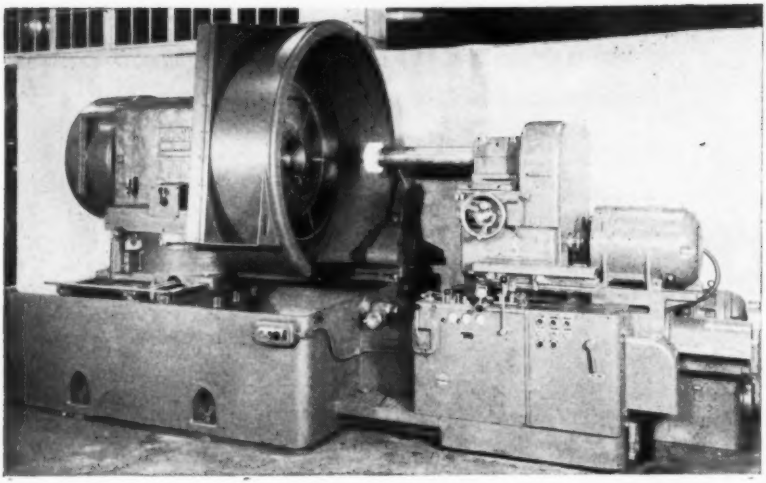
Cerro de Pasco Copper Corporation

40 WALL ST. **NEW YORK 5, N. Y.**

BRYANT NO. 150 INTERNAL GRINDER



A new large internal grinder known as the No. 150 has just been developed by Bryant Chucking Grinder Co., Springfield, Vt.

Total swing is 60″; grinding stroke (maximum depth of hole) is 14″; Maximum traverse stroke is 19″; Distance work spindle flange to wheelslide forward position, adjustable is 25″ to 45″; wheelslide cross travel 8″; cross adjustment of workhead, (front) is 16″ and rear, 14″. Workhead swivel adjustment is 0° to 60°; maximum included angle which can be ground with full 60″ swing is 60°. Rpm of work spindle is 15, 25, 35, and 50 rpm. Work drive motor (4-speed gear reduction) 2½ to 7½ hp. Wheel drive motor, 15-30 hp and net weight is 22,000 lbs.

Following well established Bryant practice, the wheelslide carriage is attached to a hardened steel bar which is supported by and slides in pressure lubricated cylindrical bearings mounted directly on the bed. Supporting the slide at rear of machine is a hardened and ground steel guide plate. Roller bearings are provided at this point between carriage and guide plate. A cylinder integral with the slide bar provides for hydraulic longitudinal traverse of wheelslide.

A preloaded anti-friction cross slide is provided for wheel spindle at top of wheelslide carriage. Both hand and power

GEARS **IN STOCK— IMMEDIATE DELIVERY**

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 70

CHICAGO GEAR WORKS, **440-50 N. OAKLEY BLVD., CHICAGO 12, ILLINOIS**

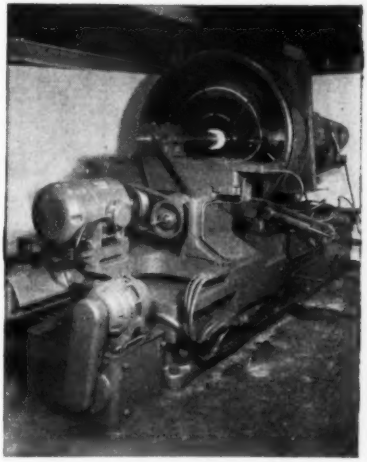
H.S. Drills, Milling Cutters, Lathe Tools, H.S. and C.S. Taps and Dies, Drill Chucks, Lathe Chucks, Tailstock Turrets, Bed Turrets, Files, Special Taps and Dies, etc.

A Complete Line of Machine Shop Equipment

Send for Our Catalog and Price List

CENTER TOOL CO., 153 CENTRE ST., N.Y. 13

cross feed are provided and an hydraulic cylinder moves wheelhead to rear for plugging the hole when wheelslide is moved to the extreme right. Cross feed is so arranged that the relation between multiple diameters can be conveniently and accurately maintained by gage blocks. Wheel spindle bracket may be mounted in different positions on cross slide for grinding large or small diameters inside or outside and also for face grinding.



The heavy duty workhead is provided with a preloaded ball bearing spindle with a 9" hole thru spindle. A face plate or any other suitable fixture may be attached to front of spindle and provision is made for mounting face plate jaws at rear of spindle.

As indicated by the specifications, a wide angular adjustment of workhead is possible and hardened steel rails are provided for approximate crosswise and longitudinal adjustment of workhead to suit a wide variety of work. Separate units are provided for the hydraulic tank and the pump and for the coolant.

The machine is approximately 14' long, 7' wide, and 90" high.

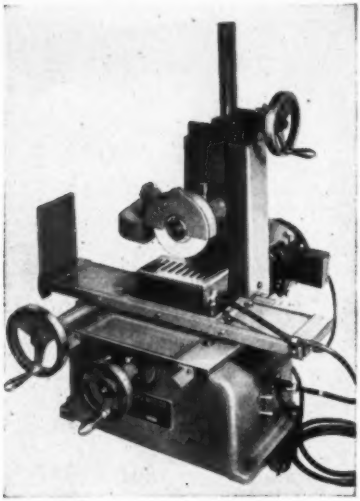
How to remove burrs - FASTER, EASIER, BETTER!

With the new NOBUR tool you can burr holes faster—improve the finish of deburred parts and lower production costs by eliminating burring as a bench operation. The NOBUR tool works like a drill, making burring a fast, easy machine operation. The NOBUR tool is available in 1/16" progressive sizes from 3/16" to 1" in diameter. Write today for new complete burring folder.

NOBUR MANUFACTURING COMPANY

910 North Orange Drive, Los Angeles 38, California

SANFORD SURFACE GRINDER



Several new refinements are disclosed in an attractive new 8-page bulletin issued by Sanford Mfg. Co., 1729-81 Springfield Ave., Irvington 11, N. J.

The Sanford Bench Surface Grinder is a sensitive high speed machine, built to rigid standards of accuracy and especially designed for jobs that "fit in your palm". It is intended particularly for the fussy little jobs which must be held to a tenth. Obviously it is adapted for all kinds of small tool and cutter grinding.

Simple means of adjustment are provided for maintaining original accurate relationship of grinding, spindle, vertical column and bed.

A dynamically balanced 1/6 hp, 3450 rpm, 110 volt, single phase, 60 cycle motor drives the spindle by means of a specially designed flat belt.

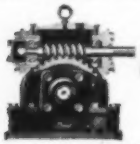
The spindle, ground from high grade alloy steel, is mounted in precision ball bearings. Adjustment is provided for bearing take-up. Vertical travel is controlled by hand wheel with .0005" graduations and actuated thru pinion, bevel gear and precision screw.

The saddle is carefully fitted to inverted, widely spaced, vee ways. Micrometer cross feed screw is actuated by a hand wheel graduated in thousandths.

IT PAYS TO KNOW
Today's SPEED REDUCTION!

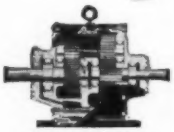
Abart SPEED REDUCERS!

Engineered to most precise reduction. Compact. Sturdy. Dependable. Spur, worm and combinations, for every condition of installation.



Abart Reducers for every duty between.

Cutaway of Type "A" 1/50 h.p., up.

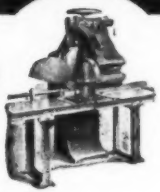


Cutaway of Type "CA" Up to 417 h.p.

Send for Abart Catalog. Over 75 types and sizes. Also gear mfrs. No stocks. Send specifications.

Abart GEAR & MACHINE CO.
4832 W. 16th ST. CHICAGO 50, ILLINOIS

"Oliver" Cut-Off Saw
FOR TUBES, MOULDINGS, STRIPS OF METAL OR COMPOSITIONS



- COMPACT
- BALL BEARINGS
- STRAIGHT OR ANGLE CUTS
- EXTREME ACCURACY

Saves Time, Space, Money:

The No. 94 DM is an efficient production saw that will make straight cuts of tubes and strips of metal, hard rubber or compositions. Self contained, very compact. Operates lightly with no rebound. Well safeguarded. Cuts hundreds of pieces without variation of .005 inch. Ball bearings for long service and smooth operation.

Write for folder.

OLIVER MACHINERY CO.
GRAND RAPIDS, MICH.

The table rests by its own weight in the saddle and travels on long vee and flat ways.

Smooth, sensitive movement is controlled by hand wheel thru closely fitted rack and pinion. Pinion shaft is mounted on needle bearings which are sealed against dust and grit and lubricated for life.

Magnetic chuck surface is 3x5"; longitudinal table travel is 8"; transverse travel is 4"; vertical movement of wheel head is 6"; standard grinding wheel dimensions are 4x⅜x½"; spindle speed is approximately 5500 rpm. Net weight is approximately 160 lbs.

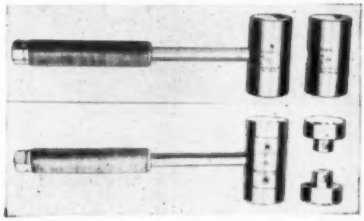
Standard equipment includes electrical equipment, magnetic chuck with tube rectifier, grinding wheel, flat belt, exhaust type wheel guard, spark shield, and spanner wrench.

Extra equipment includes diamond wheel dresser, and holder, cutter grinding attachment, and portable mounting table.

The machine is designed for dry operation only.

"SOFT" HAMMERS

Two new models of soft hammers in the light sledge weight range, have been announced by the Gregory Tool & Mfg. Co., 5300 Tireman, Detroit 4, Mich.



One has a replaceable copper or brass head, the other replaceable brass or copper tips. Each type comes in four sizes (diameter of head) 1¾", 2", 2¼" and 2½" sizes and weigh from 4½ to 10½ lbs. Equipped with a safety leather washer handle the "Perfect Balance" soft hammer has been particularly designed for the assembly of heavy machinery in tool and die shops, etc. The steel head on the removable tips model is case hardened.

The line of Soft Hammers now consists of 12 different models and 56 different numbers, ranging in size (diameter of head) from ¾ to 2½" and in weight from 3½ ounces to 10½ pounds.

Promotes Fine Workmanship . . .

While the Milwaukee Die Filer is designed to aid the Skilled Toolmaker in his work . . . it encourages keen, accurate workmanship on the part of any operator. This is due to its simplicity of design and adjustment, its speed and convenience in setting up jobs. Any mechanic of average skill can do precision filing, sawing and lapping on this reciprocal, bench type filing machine in the tool room, machine shop or trimming department.

Write for Illustrated Bulletin

$125.00 F. O. B. Milwaukee — **COMPLETE with MOTOR and SAW ATTACHMENT**

$118.50 without Saw Overarm. For machines without motor, deduct $8.50 from these prices.

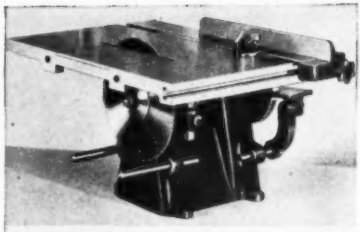
Manufactured by

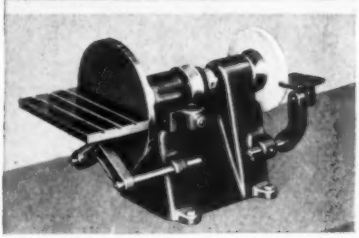
Milwaukee
CHAPLET & MANUFACTURING CO.
1027 S. 40th ST., MILWAUKEE 4, WIS.

PARLEC COMBINATION

A combination power tool for home workshops, model makers, and light manufacturing has been announced by Parlec Tool Co., 919 E Redondo Blvd., Inglewood, Cal. In the class of "why didn't someone do it before?" items, the tool is the answer to requirements for a compact, efficient and inexpensive power grinder, sander, buffer, and power saw.

The basic tool (Fig. 1) is an abrasive grinder on one end and a sanding disc with adjustable work rest on the other. Either the grinding wheel or the sanding disc may be replaced with buffing or polishing wheels for a second combination. The third adaptation (Fig. 2) makes up into a power saw in a matter of minutes. The work rest used with the sanding disc is detached by simply loosening two set screws, lifting off the sanding table, replacing the sanding disc with an 8" saw blade, and setting the power saw table into place. Adjustment for height is made by the set screws attaching table to frame. The saw table tilts a full 45° for irregular cutting. A calibrated work guide removes guess work from angular cuts, and an adjustable guide at one edge assures accurate parallel cutting. The parallel work guide slides in a "T" slot full width of table.





A fourth combination is provided in the unique design of saw table so that "Dado" heads may be used for routing, etc. A movable plate slides away from

ENGINEERS — PRODUCTION — INSPECTION MEN!
BOOST PRODUCTION AND PRODUCT QUALITY
— 15 DAY SHIPMENT ON URGENT ORDERS

CURTISS-WRIGHT CORPORATION RANKS OUR PRODUCT WITH *THEIR* BEST TOOLS. CLEVELAND GRAPHITE BRONZE COMPANY, LEADING BEARING MANUFACTURER, STATES NEW HIGH ACCURACY REACHED, PLUS SUBSTANTIAL PRODUCTION BOOSTS.

WITH

YOUNG ROLLER CLUTCH PRECISION MANDRELS

NO MORE "C" WASHERS, WRENCHES, DRAWBARS, NO MORE ARCS OR TAPERS BEFORE OR AFTER EXPANSION GRIP — CONCENTRICITY IN LOW 10,000ths — PRODUCTION OR INSPECTION.

Assured parallelism of sleeve surface to center line — absolutely no variation in repeated mounting of parts. Uniform full-work-length friction-locking gives complete control and contact of entire bore surface area — Absolutely no variation in repeated mounting of parts — no tapers — Slip part on mandrel with slight counter-clockwise motion, that's all — it's ready — Self-contained, self-expansion, self-locking, self-contraction. Instant unloading, no jamming, no adjusting — Interchangeable sleeves — you do not obsolete Young Mandrels. — Built to your bore tolerance high limit, with automatic contraction to low limit — Any mounting — Any machine operation — For bore diameters .718 to 5.5 — Reduces tool costs, extra equipment investment, operating costs, maintenance, down time, scrap, salvage.

YOUNG ARBOR COMPANY, 3257 Bradford Rd., Cleveland Heights 18, Ohio

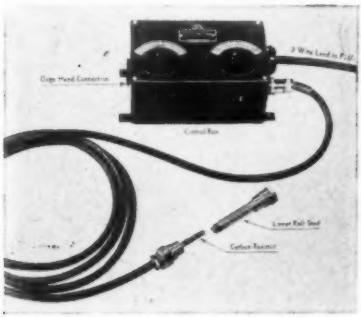
cutter, a fixture is attached to table edge in the mounting holes provided, and a conventional "Dado" tool is attached to shaft in place of saw blade. A work guide is part of the "Dado" adapter, and guides work accurately, but also maintains even pressure on work by a spring-loaded plate which is adjustable for height.

Case of the unit is cast iron, machined to aircraft tolerances, with self-lubricating ball bearings used at the two bearing points. Saw table is cast aluminum, ground to accurate flatness. The saw table is reinforced with longitudinal ribs. It is recommended that a 1/3 or ½ hp motor be used. Motor is not furnished with tool.

Other accessories are planned for the near future. A fully detailed folder is available.

P&W AIR-O-LIMIT COMPARATOR

To enable hand gaging to be accomplished at a distance from the Comparator, Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., has developed the Model R2 Air-O-Limit Comparator with Booster Relay.



The Booster Relay permits use of any length hose between gage cabinet and gage plug without any loss of speed or accuracy in the gaging operation.

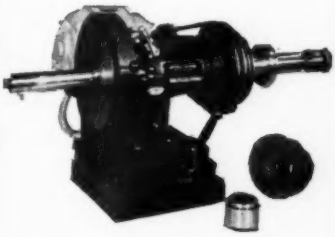
When machine operations call for remote gaging, the Booster Relay should fill the requirements.

LONG LIFE SPAN FOR "HOT ROOM" FAN—One model of a Westinghouse electric fan on "life test"—continuous operation in a 100° "hot room" without repair or overhauling—has logged 29,000 hours and is still going. The tip of the fan blade, in traveling thru 2,436,000,000 revolutions, has covered enough distance to circle the world 78 times at the equator.

HYDRO-BORER

HYDRAULIC BORING MACHINES

For those precision boring jobs. Fixtures accurately attached to face. Calibrated, eccentric boring heads. A proven machine. Other models for aircraft and automotive users. Write for suggestions on your boring problem.



HYDRO-BORER COMPANY

Division

Southwestern Development Co.

1740 W. 59th St., Los Angeles 44, Calif.

REDMER OFFERS NEW CHUCK

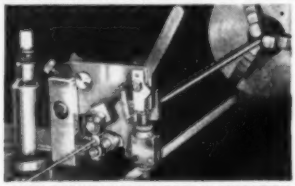
Redmer Air Devices, 608 W. Washington Blvd., Chicago 6, Ill., announce a new size collet air chuck known as the No. 10. This chuck will be the same size as the present No. 00, but will use the No. 10 collets, the same as used on Brown & Sharpe High Speed Automatics. By the use of an adapter sleeve and nose cap the No. 10 Chuck will use the regular No. 00 collets. This will make available a small compact collet air chuck with increased capacity, as the No. 10 collets have a size range from 1/16" to ½".

EDCO ELECTRODES

Eccles & Davies Machinery Co., Inc., Los Angeles, Cal. has issued a 16-page, two-color booklet "Edco Electrodes" which describes in detail the physical and chemical properties of these time-tested phosphor bronze electric welding rods. It gives uses and techniques for welding copper, bronze, cast iron, steel and their alloys; and contains a polarity table and directions for best welding results. The information will prove valuable to every welder and shop man. Copies are available by writing the Welding Division.

MICRO-TURN THREAD

SCREW MACHINE PARTS PRODUCED ON YOUR ENGINE LATHE



SINGLE POINT TURNING TOOL IN OPERATION REDUCING 5/8 ROD TO 3/16

With the Micro-TurnThread unit short run orders can be produced with screw machine accuracy, thus giving your engine lathe wider use and greater flexibility.

Detailed information on request.

MELLING TOOL CO.
JACKSON, MICHIGAN

MICROMETER-DIAL-INDICATOR

A new type of Micrometer, which has the additional advantage of a Dial Indicator, is offered by Federal Products Corp., 1144 Eddy St., Providence, R. I., marking the first radical improvement in micrometers since they were originally made in the U.S.A. over 70 years ago.

It combines the accuracy, over the full one inch (0-1") of the micrometer screw, and the precision of the Dial Indicator. It can also be used as a Dial Indicator Comparator without the necessity of setting to a master; the micrometer feature furnishes its own precision setting.

As a micrometer, the spindle can be brought in contact with the work until the indicator hand indicates "O" and the measurement is then read in the barrel and thimble.

As an indicating comparator, it can be set to the nearest thousandth of an inch, and the variation from that setting then read on the dial.

In both of these cases, the anvil pressure is constant and, therefore, the real accuracy of the instrument can be realized, independently of "feel". Use of the Micrometer as a comparator makes it highly advantageous for short runs and equally valuable as a direct reading instrument where frequent changes occur in dimensions and tolerances. A single Micrometer can replace a complete series of ordinary go and no-go gages.

The instrument is light, easy to handle and easy to read. Indicating Dial itself is integral with frame and is provided with tolerance hands, which can be easily set with the wrench furnished with the

gage. Micrometer Scale and Indicating Dial are graduated in .0001" and measuring capacity is 0-1". When used as a comparator, measuring spindle is locked positively in the desired position by a new type of thumb clamp which grips evenly, and does not throw spindle to one side or out of line. The opposite anvil is retracted by pressure on finger or thumb button. This enables workpiece to be inserted with less chance of anvils scratching the work. It also prevents excessive wear on anvils. Both contact faces are Tungsten Carbide tipped, and are lapped parallel. Retracting mechanism operates separately from the movement and cannot influence readings.

The instrument (200P-1), is finished in handsome dull chrome which is particularly suitable for ease in reading the dial, and also protects from rust.

GOODBYE FOAM—IN MOTOR OIL—Pumping air into oil-filled cylinders, this young lady shows how the serious handicap of foaming oil has been eliminated in high speed motors. The darker cylinder, treated by an anti-foam agent developed by Gulf Oil Corp., cannot be made to foam or bubble over. The lighter cylinder demonstrates how air can make untreated oil froth out of motors like foamy beer, sometimes causing shutdowns of trucks, tanks, ships, power plants and machinery. Overcoming of the foaming problem, considered serious by various Government agencies, was announced recently.

Any of the 3 Standard Carboloy Dressers—for fast dressing of a wide range of rough, semi-finish and finish grinding wheels—assure you of these distinct savings:

1. Up to 90% utility of diamond content — that's **extra** service from every dresser.
2. Use of many small stones, rather than a single, large one, insures ready-to-go exposure of a multiplicity of cutting edges.
3. No accidental diamond loss. The special matrix, diamond loaded from base to peak, holds even extremely small particles securely.
4. Elimination of **all** remounting—**these** diamonds are **always** on the job.

Daily quarter turn of dresser in holder exposes new, sharp cutting edges. Write for Folder SA-127.

CARBOLOY COMPANY, INC.
11139 E. 8 Mile Road, Detroit 32, Mich.
Also Sold By Leading Mill Supply Distributors

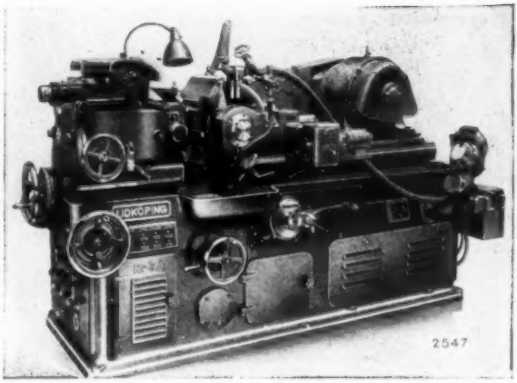
CARBOLOY

WHEEL DRESSERS

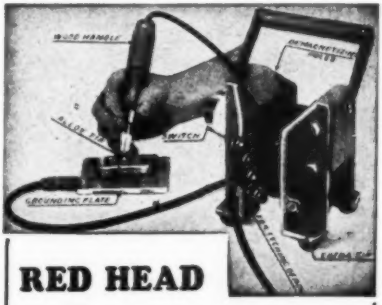
SWEDISH CENTERLESS GRINDERS

Lidkoping Mekaniska Verkstads A. B. Sweden's largest machine tool manufacturers since 1874 and a division of the well known S K F Ball Bearing Corp., exhibited their No. 3A Centerless Grinding Machine with many remarkable new features at the Cleveland Metal Show.

Triplex Machine Tool Corp., New York City who have been appointed as agents, demonstrated the machine in operation, grinding three diameters, a 30° tapered seat and a straight shoulder on airplane engine valve guides in a single operation within a total tolerance of .0008".



Lidkoping Centerless Grinders are of heavy construction and have both grinding and regulating wheel spindles supported by bearings on both sides of the wheels. Due to this rigidity, the machines are capable of high accuracy as well as of high production. A thru-feed speed of 100 ft per min and stock removal of 100



RED HEAD

ETCHERS and DEMAGNET ZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Midget Chucks.

Send TODAY for latest circulars

PRINTZ ELECTRIC CO.
7742 FENKELL AVE.,
DETROIT 21, MICHIGAN

lbs per hr have been obtained in the grinding of steel shafts.

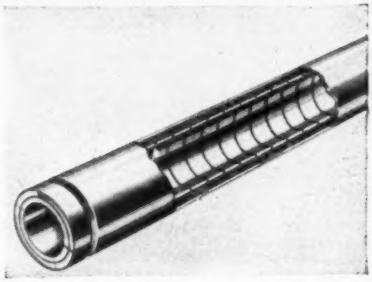
Lidkoping Grinders can be used for thru-feed grinding and for in-feed (plunge-cut) grinding. Both wheels are provided with adjustment relative to the work. A wide variety of attachments is available for profile grinding, feeding of short pieces, grinding of bars and tubes, twist drills, etc.

Horsepower rating of the grinding spindle drive motor on the No. 3A machine is 15 hp; 25 hp on the No. 4A; 50 hp on the No. 5A and 90 hp on the No. 6A grinder.

Grinding wheel sizes accordingly range from 16″ dia. x 6¾″ width to 30″ dia. x 16″ width. Lidkoping's No. 6A Centerless Bar Stock Grinder is said to be the world's largest machine of its kind and is being used in a number of British, Swedish and other continental steel mills in the grinding of shafts up to 6″ dia. and 25 ft long.

SILENCING SCREW MACHINES

Manufactured by the Corlett-Turner Co., 4011 W. Lake St., Chicago, folder No. 1245, illustrates a Silent Stock Tube in use on both single and multiple spindle automatic screw machines. Carefully engineered, and thoroly tested, this product is becoming increasingly popular with the screw machine industry, because it eliminates the terrific clatter caused by revolving bar stock.



In construction it consists of a helically wound, wear-resistant steel liner, which is covered by sound absorbent material, and encased in a steel tube to form a compact, rigid, and efficient silent stock tube. It is made in 18 standard sizes ranging from a bar capacity of ½″ to 2⅜″, and in addition for some multiple spindle machines, special size tubes are available.

No. C
WIRE ROPE
CUTTER

Hand Operated
Lever Action
Weight 110 lbs.
Price $80.00 net
Immediate Shipment

This cutter is made in two capacities:

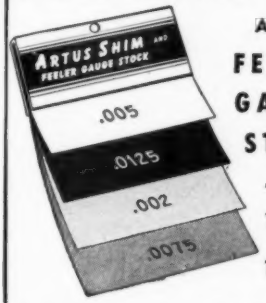
One for 1¼″ and smaller wire rope

One for 1″ and smaller wire rope.

Catalog No. 8 available, illustrating and describing our line of punches, cutters, and benders.

T. H. LEWTHWAITE MACHINE CO.
311 East 47th St., New York 17, N. Y.

ARTUS PLASTIC SHIM
AND
FEELER
GAUGE
STOCK



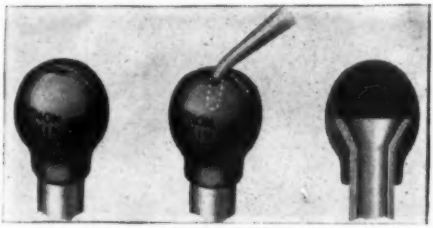
The COLOR tells the THICKNESS

● Long lasting plastic, replaces scarce metal. Each thickness a distinctive, easy to identify color. Impervious to oil. 5″x20″ sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together....$3.75

Order today. *Immediate delivery.*

INDUSTRIAL PRODUCTS SUPPLIERS
106 Water St., Dept. H, New York 5, N. Y.

SELF-SEALING CAPS FOR OIL TUBES



An entirely new type, self-sealing cap for oil tubes permits easy, one hand oiling from any direction. Is is available in colors.

The new cap is made of molded synthetic Buna "N". It is tough, flexible and completely oil resistant.

The cap is applied to the slightly flared end of an oil tube or oil line and is permanently fastened by a combination of mechanical interference fit and synthetic cement. It is properly positioned by an internal shoulder that rests on the flared end of the tube. Assembly is easily provided by a threaded tube end, or by a press fit into the bearing housing.

The cup holds a supply of oil for slow seepage to the bearing, which means less frequent oiling than when the oil supply is limited to the capacity of the tube alone. Dust and dirt are excluded by the tight sealing of the cap when the oil can spout is removed. Furthermore, the smooth, domed top design prevents collection of dirt on top of the cap.

No space is required for oiling beyond clearance for the cap itself, which is compact and streamlined. There is no limitation as to size, the caps being presently available for oil tube sizes from ⅛" to ½" O.D.

Details and drawing A-2000 are available by writing Eynon-Dakin Co., 1847 West Bethune Ave., Detroit 6, Mich.

SAFETY DIRECTORY

The first annual edition of Best's Safety Directory and Catalog will be ready in the fall of 1946. It will list all products,

WE AS AGENTS CAN SUPPLY THE FOLLOWING NEW EQUIPMENT

- PUNCH PRESSES
- MOTORS
- KICK PRESSES
- BUFFERS & POLISHERS
- GRINDERS
- SWING SAWS
- LATHES, SHAPERS, MILLERS
- TAPPING HEADS
- METAL SHEAR

AND ALL OTHER TOOL ROOM SUPPLIES

W. L. STEEGE MACHINERY CO.

25 So. Jefferson St. Chicago 6, Ill.

WHITNEY-JENSEN PRODUCTS

30 YEARS EXPERIENCE

Nos. 10-11-12

BALL BEARING PUNCHES

CAPACITY — ⅜" THRU ¼"

PUNCHES and DIES

3/32" THRU ½" BY 1/64" VARIATION

HANDY FOR MAINTENANCE

Write for Literature

WHITNEY METAL TOOL COMPANY

115 FORBES ST. • ROCKFORD, ILL.

equipment and devices related to safety and accident prevention, describe fully each product in its specific category; give the uses of each product, list the manufacturer and provide a geographical list of local dealers and distributors. The book is being published by Alfred M. Best Co., Inc., 75 Fulton St., New York 7, N. Y.

FACILITATES CHISELING

Cemented carbide's ability to withstand a reasonable amount of continuous shock and impact may be considerably underrated. At least, this would be indicated from use of chisels tipped with Carboloy Cemented Carbide to cut inscriptions in

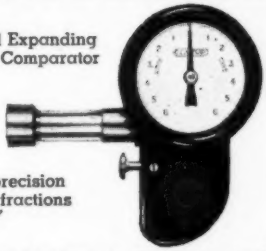
monuments, headstones, corner stones, etc. These Carboloy stone chisels are used in a sculptor's air hammer by their originator, C. T. Metzger of Troy, Pa., to chisel inscriptions on marble and granite. He reports ability to cut out monuments and chisel inscriptions in about one-fifth the time required when he used plain steel chisels.

The carbide stone chisels were made simply by brazing a small Carboloy blank —Grade 55A—into a slot in the end of the steel chisel. In addition to speeding up the work, Metzger claims that the finished job of lettering is neater than previously.

Now available for holes down to 1/8"

COMTORPLUG

Patented Expanding Internal Comparator



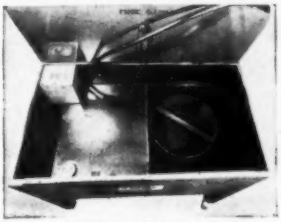
Gages precision holes to fractions of .0001"

Now available down to .1250" dia. (and up to 7" and larger) Comtorplug makes precision internal gaging simple and sure at machine, inspection bench and by final inspectors. Automatic accuracy showing size, front or back taper, out-of-round, bell mouth, etc.

Request Illustrated 8-page Bulletin 31

THE COMTOR CO.

62 Rumford Avenue Waltham, Mass.



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ONE MAN

WASHES, DEGREASES AND CLEANS METALS FASTER, CHEAPER AND BETTER! NO HEAT REQUIRED

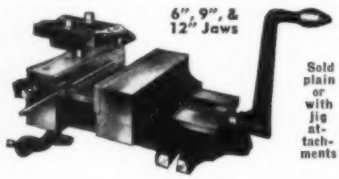
One Man and Cooper's Metal Parts Washer does the work of 2 to 5 men for cleaning Metal Parts. One operation for removing grease, cutting oils, chips and dirt from Aluminum, pewter, White Metal, Steel and Iron. Powerful spray hose using cold solvent quickly cleans Metals. Used by America's leading Industries.

D. C. COOPER CO.

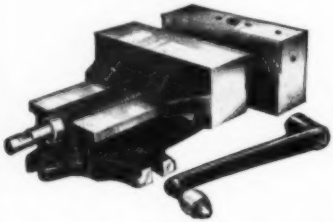
1467 So. Michigan Ave. Chicago 5, Illinois

Harrison 8047

A BASIC UNIT for positioning plain, irregular or repeat-operation work



GRAHAM MULTI-PURPOSE VISE



In sizes up to 124 lbs. for drill, press, miller, shaper, etc., this vise (with special jaws and attachments) gives you a flush, parallel, square BASIC UNIT for holding and positioning all sorts of work, instead of making special jigs and fixtures. Special drill guides are easily added, for positioning 1, 2 or more holes in accurate relation, while stops, guides, shell and V-jaws accommodate an amazing variety of work.

Request Illustrated Price Circular

GRAHAM MFG. CO.

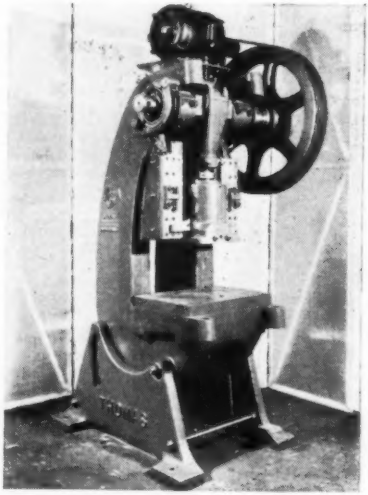
55 Bridge St., East Greenwich, R. I.

THOMAS PRESSES

Thomas Machine Mfg. Co., Pittsburgh, Pa., has launched production on a new series of open back inclinable presses of 50, 75 and 100 ton capacities.

Thomas-designed, the new series extends the firm's line of presses and introduces numerous improvements in design, construction and operation.

Construction features include a one-piece forged high carbon steel crank shaft of exceptionally rigid design with ground and polished bearing surfaces. Unusually large bronze bushed main bearings are of the 45° split type, transmitting thrust directly to the frame which is of semi-steel, well seasoned and of high tensile strength without excessive weight.



Lubrication is provided over entire length of gibs, which are adjustable and easily replaced.

The well-balanced flywheel has the hub so designed that the tool steel driving and backing blocks can be replaced when worn. The flywheel can be backed up without damage to clutch mechanism.

The new series also features a massive Pitman, connected with the slide by a heavy screw of the ball and socket type. Provision is made for a knock-out bar in all presses.

Another interesting feature is a patented safety clutch permitting single-stroke non-repeat, or continuous operation at will of operator. Means are provided for locking presses out of operation when setting dies or making other adjustments. All clutch parts are interchangeable and those subject to wear are of alloy steel carefully heat treated.

An outstanding safety feature of the new series of presses is a safety stop incorporated in shaft. If brake should fail to stop shaft at top center the safety stop will prevent accidental dropping of slide. The brake is self adjusting.

BARNABY TAP HOLDER

A new draw-out-style tap holder is announced by Barnaby Mfg. & Tool Co., 70 Knowlton St., Bridgeport, Conn. Known as the "Jam-Proof" Non-Releasing Tap Holder, this tool is of rugged construction and is claimed to monitor the severest tapping operations without sticking or jamming.

A small amount of float is incorporated to correct for any slight misalignment in the machine, and two free-sliding cylindrical guide keys—an exclusive feature—do much to assure trouble-free operation. The extra-heavy set screw will withstand long use without stripping; and all parts are precision-made and hardened for maximum service life. These new tap holders are available in three sizes, with shank diameters of 5/8", 3/4" and 1".

An illustrated bulletin describing these and other new Barnaby tools for screw machines is available.

INDUSTRY'S NEW SET OF TOOLS

The DoALL Company
Minneapolis 4 Minnesota

PHONE ANY OF THESE DoALL STORES

Baltimore	SA 5778	Denver	KE 7511	Los Angeles	TR 8713	Milwaukee	HO 5950	Montreal	HAR 4535	Orlando	6956
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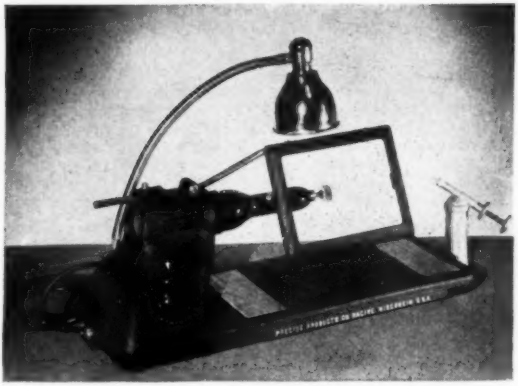
Buffalo	PA 6666	Grand Rapids	8-8922								
Chicago	SEE 1166	Hartford	5-6664								
Cincinnati	MAIN 3929	Houston	C 6538								
Cleveland	EX 1177										
Dallas	R 6010	Indianapolis	LI 8957								
Dayton	HE 2738	Kansas City	HA 5857								

Pittsburgh	AT 3386	San Francisco	GA 4784								
Providence	WI 1515	Seattle	EAST 7500								
Reading	7250	Statesville	518								
Rochester	MAIN 5175	Syracuse	3-7212								
Rockford	MAIN 227	Toledo	GA 6300								
St. Louis	CE 3621	Toronto	RA 5191								
St. Paul	EM 2390	Tulsa	4-8041								
Salt Lake City	3-9074	Vancouver	MA 2511								

PRECISE VARI-SPEED LATHE



A small high-speed lathe for use on bench or table has been developed by Precise Products Co., 1331 Clark St., Racine, Wis. to increase accuracy and speed in grinding, finishing, and polishing small products and parts made of steel, non-ferrous metals, plastics, glass, wood and other materials.

Powered by the manufacturer's Precise-35 Electric Grinder and Handtool, the lathe unit has built-in speed control. By turning a handy control dial, speeds can be continuously adjusted from standstill to a top speed of 40,000 rpm. The power unit can be detached and used separately as a handtool for grinding, milling, deburring, finishing and polishing.

The lathe stand is cast of solid aluminum and finished in black crackle. Two large recessed compartments with oak covers provide storage space for rotary tools. An adjustable safety glass shield protects operator while large lamp on

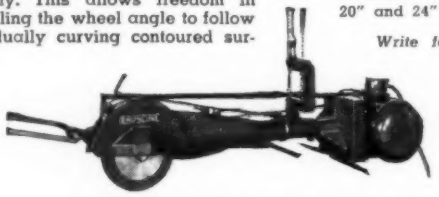
MARSCHKE *Maneuverability*

Marschke Heavy Duty Swing Frame Grinders take the wheel to the work piece. They are massive to resist vibration, yet even the largest sizes give maximum maneuverability.

The wheel is easily tilted a full 90° right or left of the normal vertical position. Even in this position, Marschke Swing Frame Grinders are well balanced in construction, both longitudinally and laterally. This allows freedom in controlling the wheel angle to follow a gradually curving contoured surface.

Grinders with wheel sizes of 16", 18", 20" and 24" are available.

Write for further details to:



MARSCHKE SWING FRAME GRINDER

VONNEGUT MOULDER CORPORATION

1805 MADISON AVENUE **INDIANAPOLIS 2, INDIANA**

flexible arm illuminates entire operating field. Small pressure grease gun allows quick lubrication of all four high-speed ball bearings.

Suggested applications of the lathe include: deburring, finishing and polishing small screw machine parts, precision castings, and carbide tools and blanks; for precision grinding and polishing of dentures, costume and novelty jewelry; for general grinding and polishing where speed, accuracy, and convenience are required.

SUPER LIGHT BALL BEARINGS

A new series of super light miniature ball bearings is now available with outside diameter of 5/16" and bores of 7/32", 3/16", 5/32" and 1/8". The bearings are manufactured of chrome bearing steel and finished to precision tolerances of +.0000 —.0002". They are shown in actual size, and it can be readily appreciated that they will occupy the smallest possible space—furnishing all the advantages of anti-friction operation in restricted locations where they can replace plain bearings or bushings.

The bearings are designed for use in small motors, computers, electronic

equipment, drive movements of recording devices, testing and laboratory equipment and supporting the moving parts of various precision mechanisms.

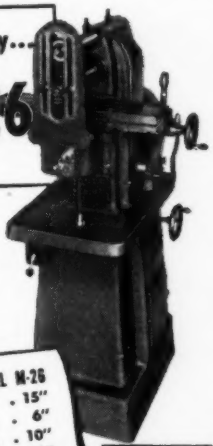
The bearings accept unusually heavy loads and high speeds for their size and weight. Full specifications and prices are available from the makers, Miniature Precision Bearings, Keene, N. H., who have manufactured various types of miniature ball bearings for many years. Immediate delivery is promised for reasonable quantities.

RUTHMAN PUMP CATALOG

A new condensed 16-page catalog describes the entire Ruthman line of vertical motor driven Gusher Coolant Pumps and accessories. The information, specifications, and prices of the various models available are given in concise simplified form. A copy may be obtained by writing to the Ruthman Machinery Co., 1817 Reading Road, Cincinnati, 2 Ohio.

When a small mill is too small and a big mill is unnecessary...

INVESTIGATE THE NEW Diamond M-26



A between-size mill, in production and tool room models

The new Diamond M-26 gives you a long-felt need—extra table travel and extra working surface—with economy that can't be matched by big machines. High production features assure rapid milling with extreme accuracy. Power is delivered to spindle with twin vee belts—quiet, efficient, non-slipping, chatter-free. Get any speed you want between 75 and 1200 r.p.m. with variable drive. Spindle rolls smoothly and rigidly on tapered roller bearings, adjustable for take-up. Automatic power feed, coolant pump and reservoir standard equipment. Full line of accessories handles all special jobs.

IMMEDIATE DELIVERY FROM STOCK

Address Dept. B for quotations. Other Diamond models available.

DIAMOND MACHINE TOOL CO.

Dept. B
3429 E. Olympic Blvd., Los Angeles 23, Calif.

BRIEF SPECIFICATIONS MODEL M-26

Table Travel	15"
Transverse Travel	6"
Vertical Travel	10"
Table Dimensions	5¼" x 26"

DIAMOND DTCO

Manufacturers of the DIAMOND Line of Precision Milling Machines and Accessories

ELECTROLIMIT CONTINUOUS GAGE

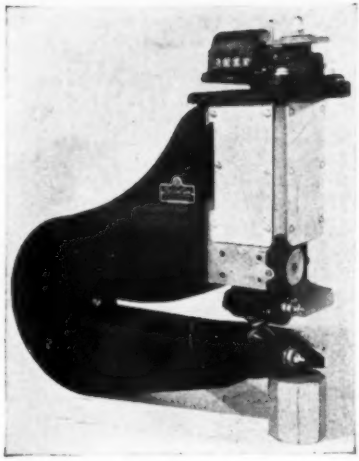
To meet the Rolling Industry's requirements for a continuous "flying mike" which will reach in farther on the rolled strip material than standard gages, Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., has announced the Model D-10 Electrolimit Continuous Gage.

This gage has a throat depth of 10", which makes it possible to measure to the center of strip material up to 19 or 20" in width. With narrower strip material, this gage will allow full width of the strip material to be measured.

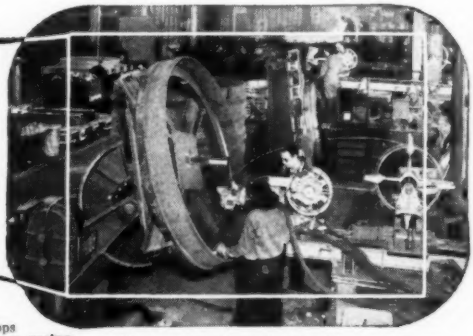
Casting of the gage head is made of Invar which has the lowest coefficient of expansion of all the metals. Therefore, the stability of the gage under the most adverse conditions, is assured.

The deep throat casting can be assembled at the factory to any standard Model D Gage. This unit then can be assembled to the present designed mill mountings where the rail is mounted vertically.

The Model D-10 differs from this Model D only in depth of the throat and the main casting. All other parts are interchangeable. Like the standard P&W Continuous Gages, the Model D-10 is accurate to .000025" under constant temperature conditions.



Setting new standards in production welding



Matching their important contribution to faster production welding for war, C-F Welding Positioners are setting new standards in post-war welding practice. Shops already equipped with C-F Positioners are pacing the field in the race for new markets.

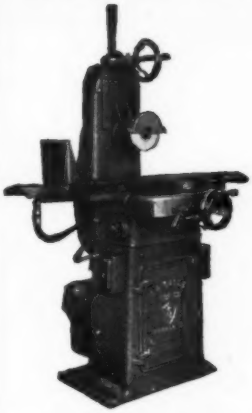
Equipped with variable speed control in any practical speed ratio, from 0 RPM and up, for handling circular or peripheral welds, C-F Positioners are speeding production welding practices everywhere. Speed selection is fast, easily made, permitting quick change-over of material being welded.

C-F Positioners as production tools are changing welding practice from slow, costly operations to faster, better automatic downhand welding. Cost of welding footage is reduced, "overwelding" is eliminated and machine or operator capacity is materially increased. There are hand or power operated C-F Welding Positioners in capacities from 1200 to 30,000 lbs. Write for illustrated bulletin WP 22. **Cullen-Friestedt Company, 1321 So. Kilbourn Avenue, Chicago, Illinois.**

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

SURFACE GRINDERS



Hydraulic Feed – Hand Feed

No. 2HFE Hand Feed 6½x24

No. 2AFE Hydraulic Feed 6½x24

No. 22 Hydraulic Feed 10x30

• • •

AMERICAN DRILL GRINDERS

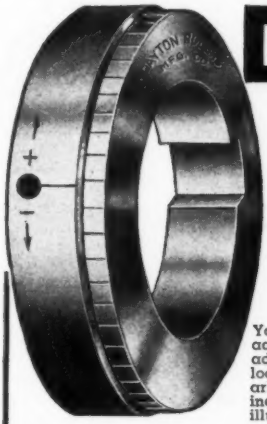
• • •

LA SALLE TOOL CO.

77 W. Washington Street

CHICAGO, ILL.

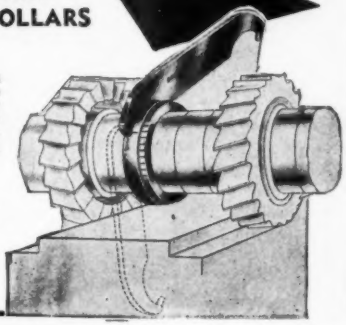
FAST, ACCURATE SPACING



Graduated in thousandths, you have plus or minus .0005" at your fingertips with

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

for SIDE MILLING CUTTERS GANG MILLING SET-UPS



You can make an accurate, positive adjustment just by loosening the cutter arbor nut and making adjustment as illustrated.

Made in 12 standards for cutter arbors from ⅞" to 2". Write for illustrated Bulletin 120-7.

DAYTON ROGERS MFG. CO.

2849 12TH AVE. SO., MINNEAPOLIS 7, MINN.

"TWEEZER" SPOT WELDING

The New Besco Tweezer Spot Welding Machine is a portable unit weighing approximately 25 pounds. To the cabinet is connected a pair of insulated, forged copper tweezers and a foot switch. It plugs into a 115V. 60 cycle power supply and may be easily adapted to 220V.

Applications are many for industries fabricating metal parts measuring .0005" to ⅛" round or thick.

To weld parts from .015" thru ⅛" round, machine is used with an auxiliary booster unit which increases capacity of the equipment by 300%.

Heretofore welding tiny parts has been troublesome because of the inherent difficulty of holding them in order to effect the weld. With the tweezers, the electrodes may now be applied directly to the elements to be joined. The tweezers probe for the parts, hold and bend them, and weld.

Because the voltage used is low, and the current flows thru the welding tweezers for about 1/1000th of a second, the tweezers may be held in the hands with safety.

Tweezer leads are flexible, plastic covered and 18" long. With use of the tweezers, oxidation is eliminated. The points require touching up only once a day.

To weld:—Set voltmeter, hold the two pieces of metal to be joined with the tweezer tips, apply pressure, step on foot switch and the weld is effected.

Complete catalog information is available from Tweezer-Weld Corp., 280 Plane St., Newark 2, N. J.

ALL WITH STRAIGHT KNURLS

using Graham "Adjust-angle" Knurl Holder

Fitting lathe turret, this holder cuts spiral, straight and checkered patterns using only straight knurls. Handles work up to 2½" dia., passing-over-stock style available.

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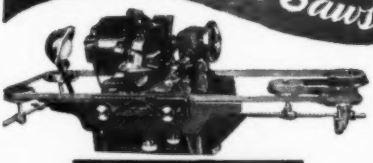


With the HOWE LINDSEY AUTOMATIC SAW SHARPENER

- HACK SAWS
- BAND SAWS
- CIRCULAR SAWS
- MEAT SAWS

HOWE AND SON Inc.

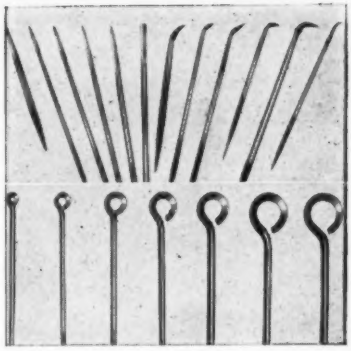
HINSDALE N. H.

DEBURRING TOOL SET

A new and unique line of hand-forged deburring tools just announced by Metal Products Co., South Bend, 24 Ind, eliminates a problem that has beset manufacturers for years.

The line features seven distinct types, each in varying sizes, with a view to furnishing the right tool for every hard-to-get at deburring operation. Channel knife type comes with sharp or square point to remove burrs from long channels and holes in machined castings. For deep holes or cross channels, there are 45° 90° angle hooks, as well as radius-curved ends, in long or extra-long sizes. The Series "F" straight scraping tool is useful for general scraping jobs, but is prescribed particularly for removing exterior burrs on machined castings. A "button hook" shaped deburrer comes in seven separate graduations. The complete line is made of fine tool steel, unimpeded operating shafts from 4¼" to 9" in length, hollow-ground, hardened, and specially tempered.

These tools are suitable for non-ferrous, hard metal work, or plastics and make it unnecessary for manufacturers to produce their own deburring devices at needless time and expense. Hand-propelled, they conveniently get into places that power or flexible-shaft tools cannot reach. The new tools are ready for immediate delivery, singly, unassembled, or in ready-made complete sets with non-splitting handles. Tests have shown them especially adaptable for work on deep slots, bottom surfaces, chamfering around holes inside castings, recessed holes, top holes, and long channels.



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LEADER IN THE GRINDING FIELD
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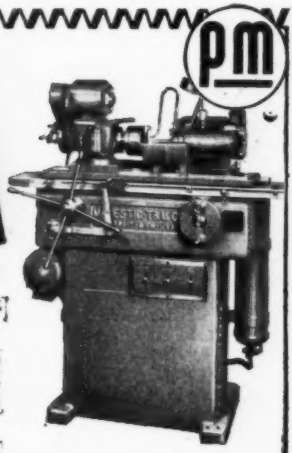
For Precision Grinding



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REPRESENTATIVES IN ALL THE PRINCIPAL CITIES
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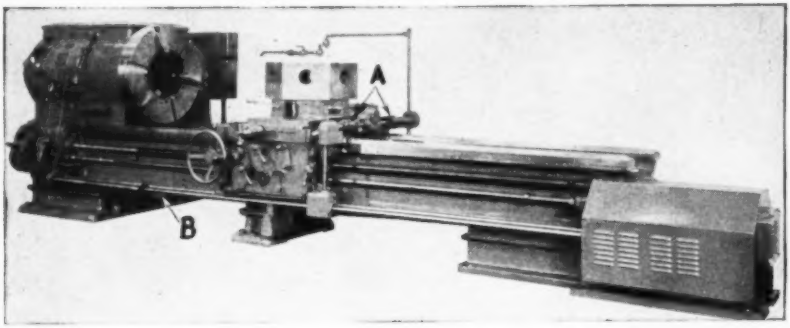
LEHMANN LATHES OFFER NEW HYDRATROL FEATURES



The accompanying illustration shows a general view of a 36" swing Lehmann Hydratrol Lathe with 16½" Spindle Hole. This machine is equipped with a 24" Hexagon Turret fitted with automatic Turret Feed Regulator having automatically positioned longitudinal and cross feed stops.

Indexing of the turret accomplishes four things:— (1), it brings a new turret face into the work area; (2), it indexes a set of front and also rear cross slide positioning stops, shown at "A" on the other illustrations; (3) it indexes a set of longitudinal stops that may be used either for positioning a cross feed cut

AIR-BLITZES dust, chips, fillings from machinery, tools, parts. Cleans hard-to-get-at places. Snappy trigger action. Easy-grip handle. Leak proof valve. Strainer-screen at air inlet. Sturdy construction; practically no maintenance cost. Try one; you'll order more! Assortment of nozzles and extensions. ¼" pipe thread.

Price $1.90 each

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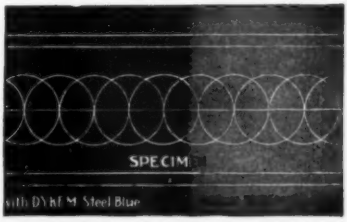

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making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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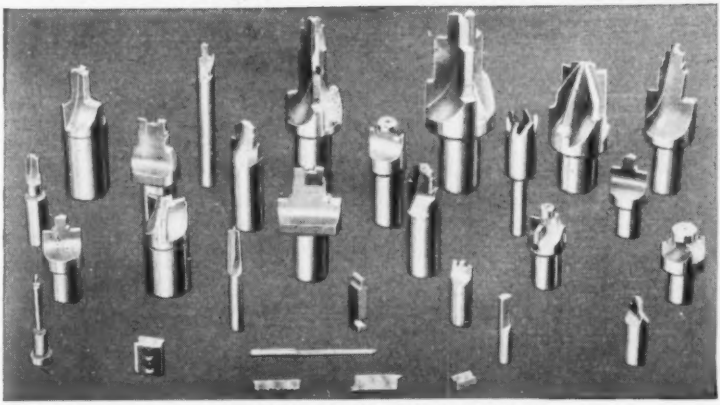

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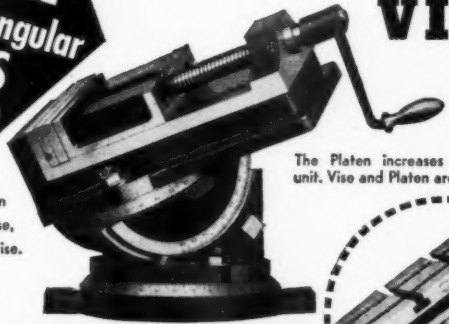
J & S TOOL CO. (MAKERS OF J. & S. "FLUID-MOTION" FORM-DRESSERS)
477 MAIN ST. - E. ORANGE 2, N. J.

SAVE TIME on intricate, angular SET-UPS

Multi-Swivel VISE



Fully universal . . . three swivels simplify the setting of compound angles. Parts interchangeable . . . can be used as a plain flanged vise, a swivel vise or multi-swivel vise.

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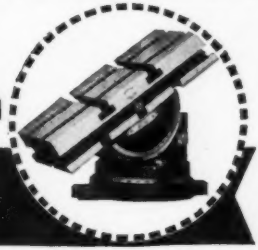
The Platen increases capacity of the unit. Vise and Platen are interchangeable.



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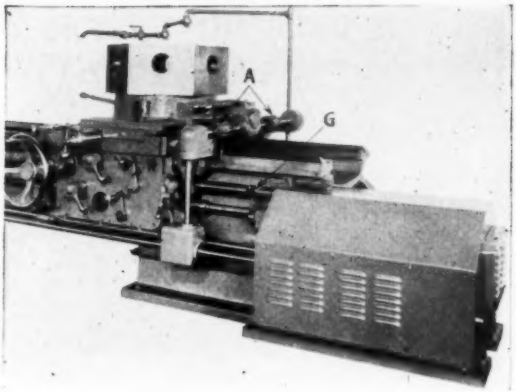
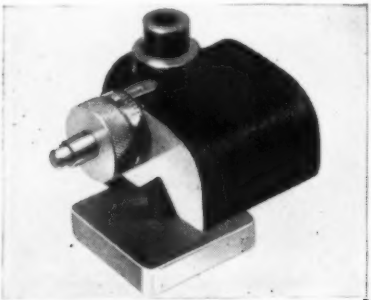


36" Hydratrol Lathe showing 24" hexagon turret equipped with automatic feed regulator having automatically positioned longitudinal and cross feed stops.

or as a precision longitudinal feed stop (shown at "B") operating a magnetic brake on the feed rod drive thru action of the Micro Limit Switches shown at "C"; (4), it automatically regulates the rate of feed by means of the six-position rotary cam shown at "D"

The feed regulating cams for each turret face are independently adjusted thru a wide range by means of the adjusting screws shown at "E" and the calibrated chart "F".

This automatically regulated feed rod drive does not interfere with the opera-



MICROMETER LATHE STOPS AT REDUCED PRICES

The Micrometer Lathe Stop is the last word in precision lathe working tools. Not large and cumbersome, but small, compact and rigid, with exceptional accuracy made possible by our construction. The handy knurled knob is graduated into 50 divisions giving a reading in thousands of an inch. Enables you to do precision lathe work and tool room jobs with your present equipment.

SMALL SIZE: For Logan, Clawson, and South Bend Lathes $10.50

LARGE SIZE: For 12", 14", 16", 18", 20" and 22" $15.00

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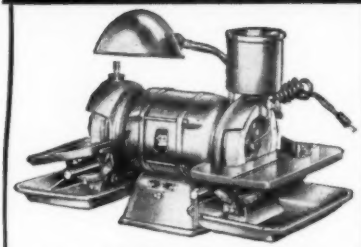


for CARBIDE TOOLS

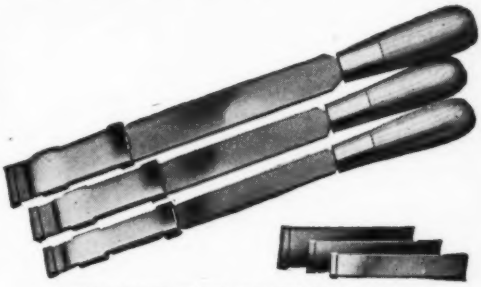
Special BALDOR Grinder for quickly and accurately sharpening carbide tools; ½ hp., ball-bearing motor; 6" Silicon Carbide wheels. Ask for Bulletin 322. $110.00

BALDOR ELECTRIC CO.

4368 Duncan Ave., St. Louis 10, Mo.

Anderson CARBOLOY TIPPED SCRAPER BLADES

Speed up scraping operations with these efficient blades. They are especially good for hard alloy iron and the extremely hard bronze castings. If you are already using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove the high-speed steel blade and slip in the Anderson Carboloy Tipped Blade. They are available in three widths.



THEY LAST 8 TO 10 TIMES LONGER

Write for Bulletin No. 3-5

ANDERSON BROS. MFG. CO.
Anderson
ROCKFORD, ILL. U.S.A.

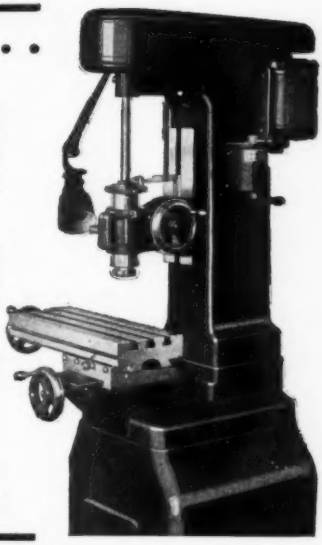
SEE OUR CATALOG IN SWEET'S

NOTHING LIKE A *LINLEY* . . .
FOR DOING SMALL JOBS

New production will undoubtedly bring a variety of small jobs into busy tool rooms that must be done fast and accurately — to keep costs down. The Linley Milling and Jig Boring Machine has been built for just such work on jigs, dies, patterns, fixtures and models.

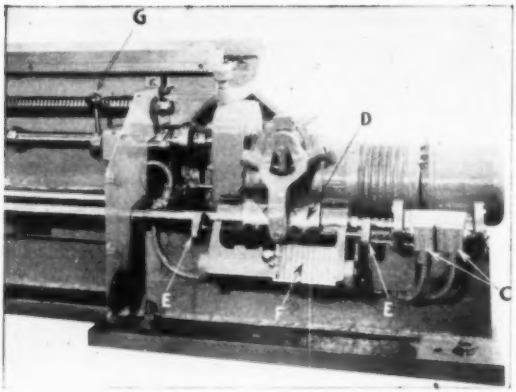
Table size (7" x 17½") is ample; 11½" provides plenty of room from table top to spindle end; only 2½ sq. ft. space needed. Linley features are 8 spindle speeds to 4250 r.p.m., velvet feed and no backlash in quill travel.

Save your larger machines for their higher rated capacity. Look into this versatile time saver and money maker.



Instructive Bulletin on request

LINLEY BROTHERS CO.
663 State Street Ext.
Bridgeport 1, Conn.



36" Hydratrol Lathe, showing drive for automatic feed regulator with longitudinal and cross feed stops.

tion of the standard lathe quick change feed gear box either for feeds or threading. Handle "G" is used to disengage the automatic drive, and is electrically interlocked to prevent the simultaneous application of power thru both drives. Threads may be cut with the turret, using the leadscrew without disengaging the automatic drive. This is accomplished by use of the half nut engaging handle "H" shown on the apron.

Hydratrol Lathes are made by Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, 3 Mo.

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LOCATE CENTERS
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OPTICAL
CENTER⊕LOCATOR

Ingenious Center-Locator saves time and makes your drill press do the work of a jig boring machine. Now you can drill and space holes to within .001" . . . drill round holes in thin material . . . avoid drill run-outs . . . counter bore holes with ordinary drill. Enthusiastic machinists claim it is the simplest, speediest, most positive and accurate method of locating centers and drilling holes yet devised. Simply layout work with height gauge, locate center through the powerful magnifier—then replace it with any of the 16 drill bushings furnished. Ask your mill supply house, or order direct.

Literature on Request.

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3014 E. LAKE ST. • MINNEAPOLIS 6, MINN.

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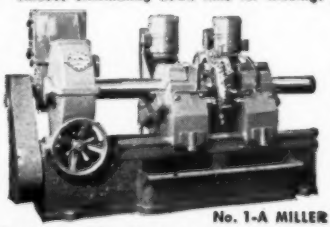
MACHINE TOOLS

• A combination of precision workmanship and advanced design contribute to the quality of output and quantity of work pieces produced on Roto-Matics. Production far exceeds that of standardized equipment used in the metal working industries today, because practically all operations are continuous eliminating down time for loading.



No. 1-A MILLER

Catalogue B-90 illustrating and describing various types of drilling, milling, reaming and boring machines is available on request.

DAVIS & THOMPSON CO.
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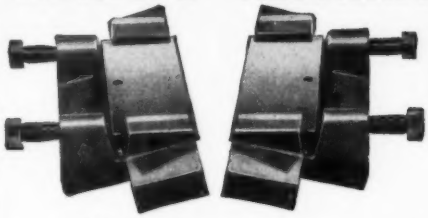
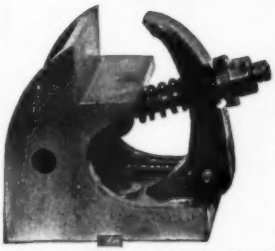
HART'S Machine Vise Jaws



These Jaws are useful on any machine table. The angle holding the work down. Suitable to clamp or bolt to table. The hardened tool steel jaw measures 3"x6" ½" thick angle edge serrated.

HART'S Milling Fixtures



These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes —to hold stock from ½ to 5 inches.

HART MACHINE CO.

26 MATHER ST., DORCHESTER, BOSTON, MASS.

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...and here's the Answer

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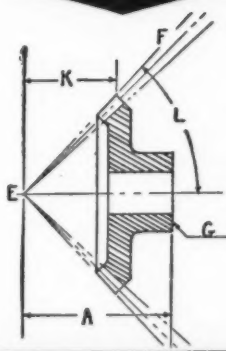
No Long Calculations

No Involved Set-up



With Herkimer sine bars and bevel-gear gauges, anyone with ordinary gauging experience and ability to read blueprints can quickly and accurately check all important bevel gear dimensions and relations. Production gauging made easy.

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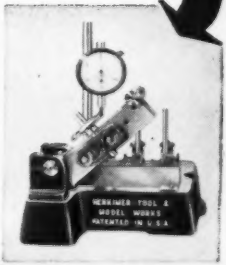
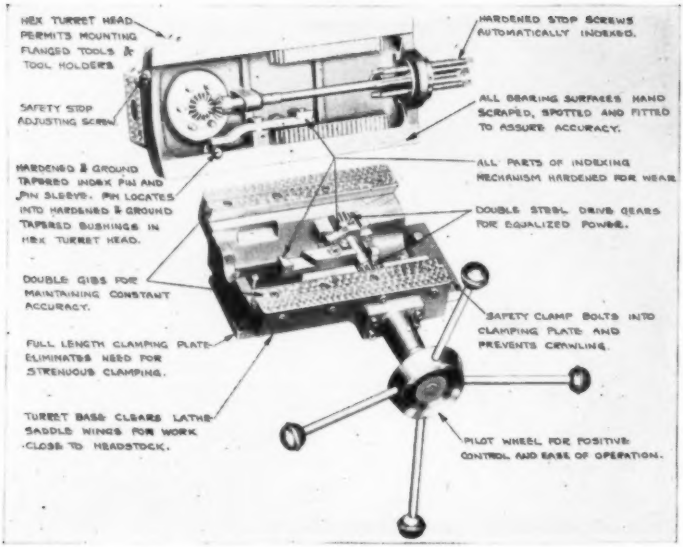


HERKIMER TOOL & MODEL WORKS, 108 King St., Herkimer, N.Y.

ENCO HEXTURRET


HEX TURRET HEAD PERMITS MOUNTING FLANGED TOOLS & TOOL HOLDERS
HARDENED STOP SCREWS AUTOMATICALLY INDEXED.
SAFETY STOP ADJUSTING SCREW
ALL BEARING SURFACES HAND SCRAPED, SPOTTED AND FITTED TO ASSURE ACCURACY.
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DOUBLE STEEL DRIVE GEARS FOR EQUALIZED POWER.
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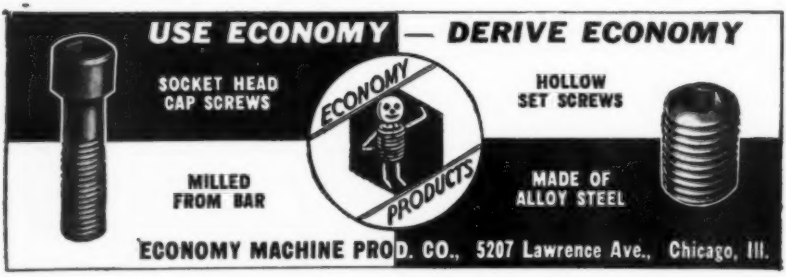
SAFETY CLAMP BOLTS INTO CLAMPING PLATE AND PREVENTS CRAWLING.
FULL LENGTH CLAMPING PLATE ELIMINATES NEED FOR STRENUOUS CLAMPING.
TURRET BASE CLEARS LATHE SADDLE WINGS FOR WORK CLOSE TO HEADSTOCK.
PILOT WHEEL FOR POSITIVE CONTROL AND EASE OF OPERATION.

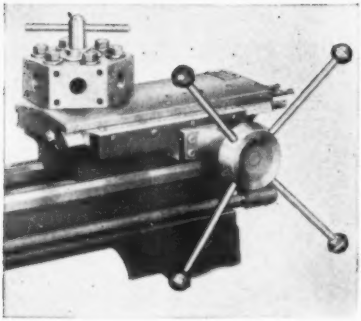
A new bed turret for lathes up to 14" swing has been announced by Enco Mfg. Co, Dept. 22, 4522-24 Fullerton Ave., Chicago 39, Ill., makers of Enco Lathe Turrets and Multiple Tool Holders.

Known as the Hexturret, it uses double steel drive gears and double racks for equalizing feed of the tool on the work. This twin drive also is said to keep the turret in alignment and to minimize wear. Double gibs of the heavy duty type are employed to maintain constant accuracy providing for an adjustment from either the front or back dovetail.

All bearing surfaces are hand scraped, spotted and fitted to assure proper alignment and long, carefree use. All parts of the indexing mechanism are hardened. Extreme precision of indexing is claimed thru use of hardened and ground tapered bushings in turret head, and hardened and ground tapered index pin and pin sleeve.

Versatility of this turret is increased by the Hex turret head which permits





mounting flanged tools and tool holders. Other features include clearance of the lathe saddle wing for close work to headstock; a safety clamp to prevent "crawling" of the turret, and hardened stop screws.

Complete literature, including detailed photographs, is available showing the complete construction and giving all necessary specifications. Moderately priced, this bed turret is available for prompt delivery.

TAPERED CUTTING TOOLS

A new tapered cutting tool has been developed by Conical Tool Co., 423 Division St., South, Grand Rapids, 3, Mich.

This tool is made under a patent covering a tapered cutter with a constant spiral with a uniform angle from base of shank to the bottom end. Most spiral tapered tools straighten out towards the small end and therefor do not cut as well on the bottom. The cutter has much better shearing action because of the constant spiral. It is made with three flutes which are claimed to have many advantages over two or four flutes.

It should be useful among makers of metal patterns, extrusion dies, plastic molds, die casting dies, permanent molds, any type of core or wherever they use draft or taper.

The tool cuts with a smooth finish and does not batter the metal, enabling the operator to follow the line on the work.

These cutters are made in standard sizes with tapers of 1,2,3,5 and 7 degrees.

Universal Stock Reel

The Humm Universal Stock Reel is an essential device for the handling and feeding of coil stock to Power Presses.

1. **Adjustable Reel to fit various sizes of coil.**
2. **Reel is adjustable to suit height of Press.**
3. **Reel can be inclined to any position.**

PRICE $55.00 F. O. B. BROOKLYN, N. Y.

Manufactured By

John Humm Safety Equipment Co.
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BROOKLYN 7, N. Y.

BROACHES

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Most Standard Keyway Broaches Carried in Stock

Reconditioning, Salvaging and Converting High Speed and Carbide Tipped Metal Cutting Tools

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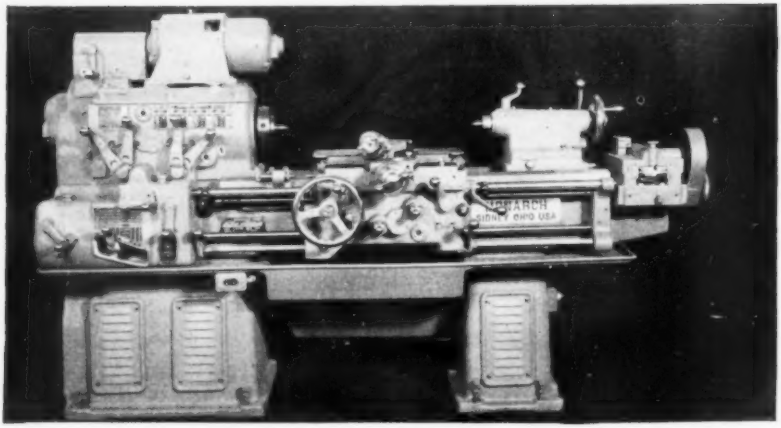
Commodore 0400 CHICAGO 28, Ill.

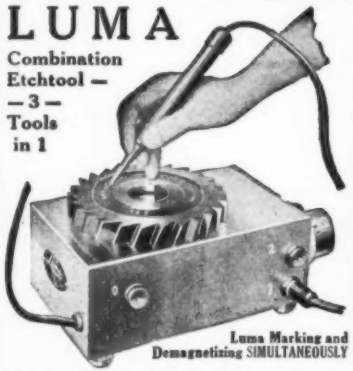
MONARCH MOLD-MAKERS TOOLROOM LATHE



A new type of universal toolmaker's lathe has been developed expressly for mold-makers by The Monarch Machine Tool Co., Sidney, Ohio. It is available in a size corresponding to a 12" toolroom lathe, swinging 14½" over the bed, with

LUMA

Combination Etchtool — —3— Tools in 1



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Luma Electric Equipment Co.

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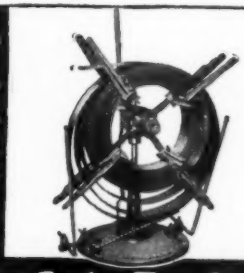
LITTELL REELS



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LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A free loop of material is supplied to automatic feed, regardless of weight of coil.

Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production.

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Used to lift to desired height for any operation, then smoothly rolled to the next machine and height-adjusted as required. Used as a level under overhanging work; as a portable work bench; to charge and discharge heat treating furnaces. Used in tool room and stock room, in loading and unloading.

Write for descriptive literature today . . . now, while that good impulse holds. (It doesn't cost a cent to find out!) Address Department A.

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SUPER SENSITIVE DRILLING MACHINES · TAPPING MACHINES · PORTELVATORS

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a distance between centers of either 30" or 54".

The features of this new development for mold-makers in no way hampers its ability to do all the types of precision toolmaker work required of any toolmaker's lathe.

In addition to the lathe as known today, there are two extremely important features on this machine which are available, in addition to all standard accessories required for lathe operation. The one which gives greatest assistance to mold-makers is an adjustable leadscrew variating mechanism which can be adjusted to compensate for shrinkage of material being molded. When a thread is to be placed in a mold and extreme accuracy is required in the finished product, lead of the thread must be greater in proportion to shrinkage of the material. If shrinkage of the material is 3 per cent, the leadscrew variating mechanism can be so set, or if the shrinkage is only .001" per 1.000" the leadscrew variating mechanism can be set to compensate for this small amount of shrinkage. Then the thread can be chased in the mold following normal procedure.

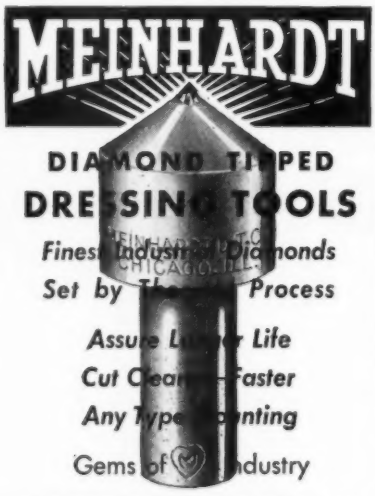
Since many molds require miscellaneous internal and external milling operations, which many times must be performed at the single setting of the mold in a lathe, a speed reducer, which can be connected at will, is mounted on top of the normal headstock to permit speeds as low as a fraction of a revolution per minute.

Machines of this type installed in mold shops in the later years of the War established remarkable savings, not only in mold work, but in many types of regular toolroom operations.

DRILL AND REAMER CHARTS

Danly Machine Specialties announces a new series of Dowel Pin Drill and Reamer Charts cataloging their line of precision dowel pins. These handy, one-page charts contain explicit drilling and reaming instructions for dowelling in cast iron and steel. Convenient for shop display and use—the charts are prepared on cardboard and light paper stock, and in plain and varnished finishes.

Copies trimmed to 6¼" x 10" may be obtained for tool makers and engineers by writing Sales Service Dept., Danly Machine Specialties Inc., 2100 South 52nd Ave., Chicago 50, Ill. Specify heavy or light stock—plain or varnished finish.



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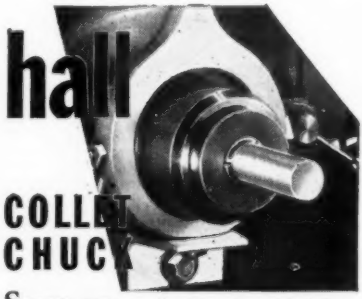

SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only $145
One-inch capacity, $95
Round, square or hex collets, plain—serrated

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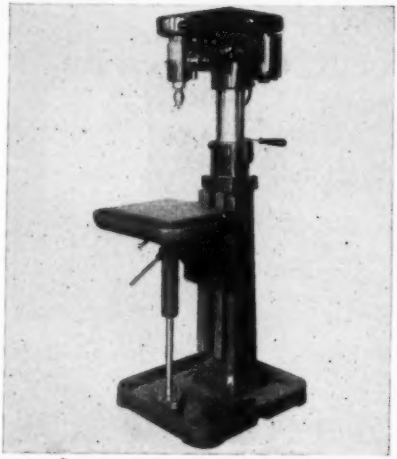
THE DRILL WITH A HUNDRED AND ONE SPEEDS



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ABILITY TO OBTAIN EXACT SPEED FOR DIAMETER OF DRILL AND MATERIAL TO BE DRILLED RESULTS IN LESS BREAKAGE, FEWER GRINDS AND HIGHER EFFICIENCY.

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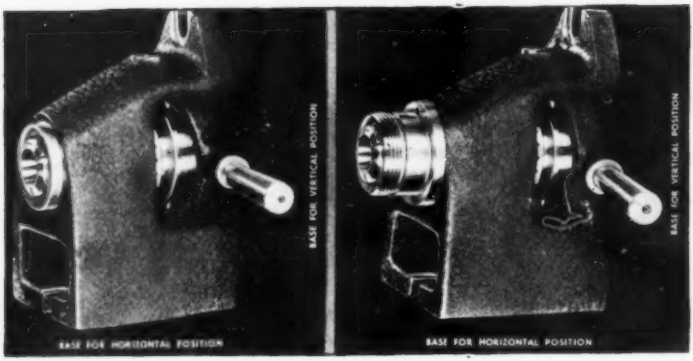
HARDINGE COLLET HOLDING FIXTURES



The large collet capacity, compact design and versatility of set-up soon popularized the Collet Index Fixtures introduced by Hardinge Brothers, Inc., Elmira, N. Y., in 1938.

Hardinge has now brought out two new Collet Holding Fixtures to fill the need for lower cost fixtures with stationary spindles for production where indexing is not required. In addition to the compact design, the bases are machined so the Fixtures can be used in either horizontal or vertical position, making these Fixtures readily adaptable to special drilling, milling, grinding or broaching set-ups.

Both Fixtures take standard 5C Hardinge Collets, affording interchangeability with the Hardinge Collet Index Fixtures and Precision Second Operation Machines. The 5C Collet has a capacity of 1" round, 7/8" hexagon and ¾" square. The Collets are operated by the lever collet closer with a 100 to 1 leverage.

The HV-H Fixture, shown at the left has an overall height in the vertical position of 5". Distance from horizontal base to center of spindle is 4.000".

The HV-HN Horizontal-Vertical Collet Holding Fixture with threaded nose spindle is shown at the right. It combines features of the other Fixture with the important addition of a threaded nose spindle. The latter threaded nose spindle on the Hardinge Precision Lathes, Second Operation Machines and HV-4N Collet Index Fixtures, providing interchangeability of nose accessories—jaw chucks, step chucks or special fixtures. Use of Hardinge step chucks and closers provides lever operated step collet capacity to 6" diameters. Overall height of the Fixture in the vertical position is 6⅛".

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Direct Reading Accurate, Fast, Simple. New timely tool SAVES TIME, SPEEDS UP PRODUCTION. Graduated scale, easily read at a glance. Adaptable to all types, shapes of work, wood or metal. Measures 0 to 4 inch.

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(3 Types—8 sizes to choose from)

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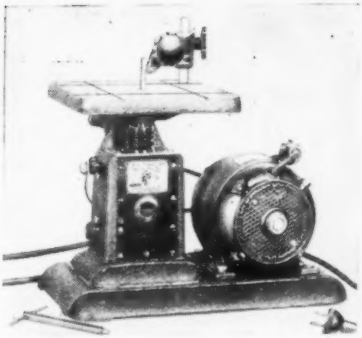
ALL-AMERICAN DIE FILER

The All American Tool & Mfg. Co., 1014 W. Fullerton Ave., Chicago, offers a Precision Die Filing Machine, said to insure complete accuracy in filing, honing and sawing. This is made possible by a patented universal joint file clamp which assures a 100% vertical file position despite warped or twisted file shanks. A file setting square is supplied for aligning the file or other tool before the universal joint is tightened.

An overarm is provided to hold file against work. Tilting table to hold work is 8¼ x 8¼". File is actuated by a scotch yoke mechanism running in an oil bath. Window in housing shows correct oil level at all times. Vertical shaft bearings are adjusted by locking thumb screws on the outside.

A neoprene bellows effectively seals off housing against seepage of oil or entrance of chips. Unit is powered by 1/6 hp, 110 v. a-c 1725 rpm motor. File or other tool has stroke of ¾" at approximately 425 strokes per minute. Universal joint file clamp has a capacity of ⅛" to ¼" dia. shanks.

Unit is completely described in Bulletin 115.



WATER-MIXED CUTTING FLUIDS

A 20-page pocket-size booklet, "Water-Mixed Cutting Fluids," containing a wealth of practical information for users of so-called "soluble oils," is offered by D. A. Stuart Oil Co. Among the featured articles are "Cutting Fluids and Hygiene" and "Design Data for Cutting Fluid Systems," with accompanying charts. For free copies write to D. A. Stuart Oil Co., 2739½ South Troy St., Chicago, 23, Ill.

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SHEFFIELD TEMPLATE GRINDER

A template grinder with electronic control of wheel head axial traverse for the precise grinding of templates and other work up to 72" in length, 8" in depth,

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L-R Type "A" 1/6 to 40 H.P. Duties
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Rugged, L-R Flexible Couplings require minimum attention. Load cushions always in sight for inspection. No lubrication required. Exceptionally quiet.

Type "A" shown has only 3 simple parts—2 metal jaws and resilient spider cushion.

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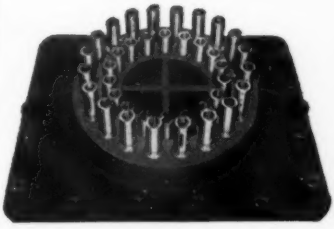
5026 West Lake Street, Chicago 44, Illinois

and 1" thick, without re-positioning is announced by The Sheffield Corp., Dayton, Ohio.

The machine was originally designed for the specific purpose of grinding templates used in laying out and checking automobile body dies and parts produced with such dies. These templates are approximately ⅛" thick, and as many as eight can be ground at one time. Templates for many other types of profiles, including those encountered in aircraft fuselage and wing manufacture, can be made at low cost due to the speed with which the grinding operation may be performed. The Grinder consists primarily of a base upon which wheelhead with control panel and optical equipment traverses, the electronic control unit and a work table with adjustable paralleled work supports. The work, with the desired profile scribed on it by either a scriber or by a photographic process, or with a master template mounted on top is clamped on the work table. The supporting parallels are adjusted to the rough outline of the work. The wheelhead is positioned on the transverse ways by the electronic controls to bring the wheel opposite point where grinding is to start. Axial movement of workhead also may be accomplished by turning the knurled knob to the left of handwheel. Wheelhead may be adjusted on a turret to a maximum of 40° on either side of center so as to meet any conceivable requirement for positioning caused by shoulders and other irregularities of the profile to be ground.

The grinding wheel reciprocating slide is then properly positioned for the required stroke within a range of 0" to 1¼". Speed of reciprocation may be set at either 50 or 100 strokes per minute.

Wheel is brought in to the work by a manual cross slide feed hand wheel. Two ratios of cross feed (fast and slow) are provided. Operator views the work thru a 20 power microscope in setting wheel to work, and in performing grinding operation. He guides the microscope cross hairs along the lines of scribed work by means of cross slide handwheel as wheelhead travels transversely. Four different reticles having diameters respectively of .005, .0075, .010 and .015" are provided with the microscope to be used for grinding work to varying degrees of precision.



Pictured: a 38-Spindle Heavy-Duty Drill Head.

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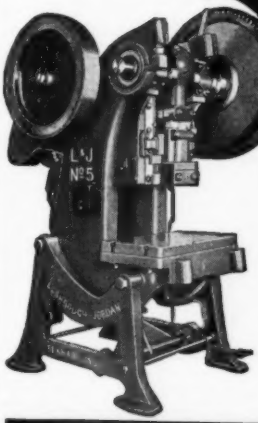

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NO. 5 BACK GEARED TYPE

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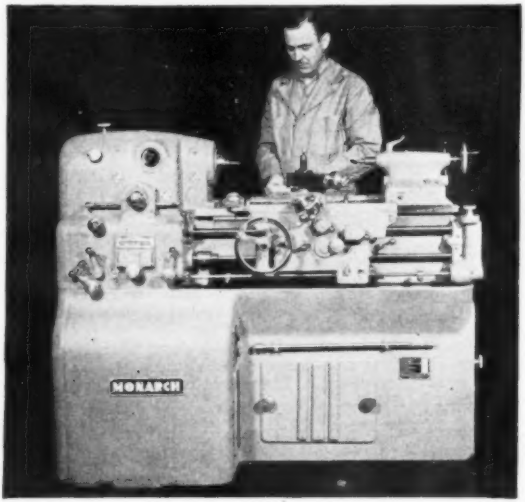
successors to Lushbaugh-Jordan Tool & Machine Co.
1625 STERLING AVE. ELKHART, INDIANA

10"x20" MODEL "EE" SENSITIVE PRECISION TOOLMAKER'S LATHE

A new model of EE 10" Sensitive Precision Toolmaker's lathe is in production at The Monarch Machine Tool Co., Sidney, Ohio.

It retains the same streamlined appearance of its predecessor, but contains a number of improvements. Higher sustained operating speeds will be possible with the new machine, due in part to design changes assuring more complete lubrication of all gears and moving parts, regardless of what operation the lathe is performing.

Apron bearings, bed and carriage ways and cross slide are provided with forced-feed lubrication. End gears are totally enclosed and running in oil.



Convenience of the operator has come in for attention too. He will no longer find it necessary to change end gears to obtain the full range of feeds and threads. A single lever, located on front of gearbox, handles the shift from belt drive (with 50 feeds) to end gearing (with 60 threads).

Another innovation is the thread chasing mechanism which provides independent adjustment to cross slide at operator's option, even tho working against a positive metal-to-metal stop.

The half-nut lever has been repositioned on apron and now operates in the same direction as cross feed and longitudinal feed levers.

Ease of maintenance has also been given considerable thought. The electrical equipment, while enclosed in lathe base, has been mounted separately from other equipment such as pumps to simplify inspection or removal.

Similarly, all electrical switches and connections for leadscrew reverse are brought out to one point—a box on tailstock end of lathe—where they can be easily reached.

Threading and feeding mechanisms have been interlocked so they cannot operate together. In absence of an electrical leadscrew reverse, a lever on front of headstock controls forward and reversing and has been equipped with automatic neutral lock. In the same way, a leadscrew reversing lever on apron has been provided with an automatic lock to prevent accidental starting of spindle.

Other important improvements include: —(1) hardening and grinding of all leadscrew, cross feed and compound screws, (2) substitution of lighter metals, such as aluminum, for cast iron parts where the same strength can be obtained, and (3) screening of all guards and cover plates over louvre openings to keep out dirt and chips while providing adequate ventilation.

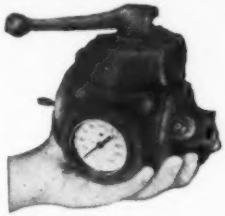
For rapid precision threading an adjustable reverse speed is provided to give quick return for multiple cuts.

The gearbox, which provides 60 different threads, is totally enclosed to permit use of a flood of oil for lubrication. Its direct reading index plate clearly defines position of the hardened and ground gearing for all threads and feeds.

FACILITATES WELDING

A new arc-welding compound designed to aid in instantaneously creating and maintaining a metallic welding arc where low currents and small-diameter electrodes are employed has been announced

NEW *Lehigh*-MARTON COMBINATION UNIT



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Also available: DELAYED ACTION VALVE for single control of multiple operations. PACKLESS, QUICK OPENING HAND OPERATED VALVE for 4-way operation. Ask for Bulletin BBIOI.

MARTON AIR-VALVE DIVISION
LEHIGH FOUNDRIES, Inc., Easton, Pa.
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Immediate Delivery!

Standard Size Dowel Pins from 1/8" to 1" diameter and from 3/8" to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

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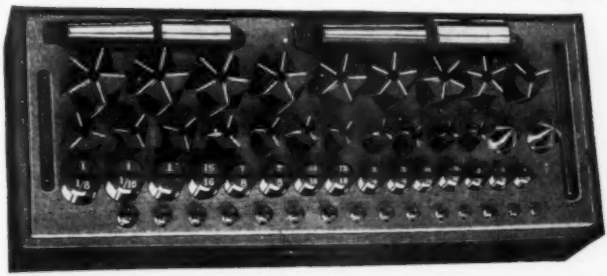
A kit of these efficient tools eliminates costly delays in counterboring and spotfacing. Seven sets from which to choose. Each contains a logical selection of interchangeable counterborers, pilots and holders. Write for prices and Bulletin C.

Set C-13, below, consists of 2 holders, 20 cutters ranging from 9/16" to 1-3/4"; 28 pilots ranging from 9/32" to 1-1/8" and two countersinks, 7/8" x 70° and 7/8" x 82° are included. All neatly boxed with hard wood cover.

THE GAIRING TOOL CO., Detroit, Michigan

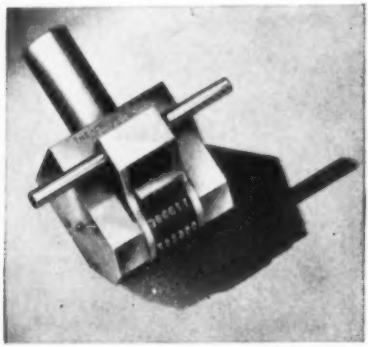


by the Electric Welding Division of the General Electric Co., Schenectady, N. Y. Known as Strike-easy, this new compound is easily applied and can be used on any kind of metal with any type of electrode.

The compound, which is in paste form, is available from distributors in one-pound glass jars, completely ready for use. No mixing or other preparation is required.

ACROMARK NUMBERING MACHINES

Scientific advance in the engineering and design of numbering machines by Acromark has resulted in greater strength and lighter weight.



Development of a minimum of parts for positive automatic action has evolved into scientific construction of those parts for maximum strength and minimum weight. The use of new alloy tool steels of maximum resistance to the various stresses such machines must withstand have made these developments possible.

For example, numbering wheels no longer need contain volume of material for strength which permits the numbers to be closer together giving normal spacing.

Wheel shafts or axles are now of a selected alloy tool steel, turned to size that will sustain expected pressures and hardened for fortification against shock and wear.

Frames and shanks are made of one piece for maximum strength and minimum weight. Operating mechanisms for automatic action, which were formerly oversize for manufacturing convenience or for minimizing of wear, are now reduced in weight and fortified by controlled hardening where wear occurs or strength is needed.

A most important improvement is in the size of the machine for a given number of wheels. Where the same size of frame was formerly used for 1/16", 3/32" and ⅛" size figures, now smaller frames are used as the size of the characters and number of wheels decreases. This is particularly advantageous where small instrument, watch or other mechanical parts have to be numbered.

Further information is available from The Acromark Co., 15 Morrell St., Elizabeth 4, N. J.

THE MICROCAST PROCESS

The Austenal Laboratories, recently published an interesting booklet called "The Microcast Process" which gives a complete easily understood explanation of this unique process of precision casting.

This new booklet comprehensively explains the industrial design advantages toward obtaining a better product made possible thru Microcast. The history and early applications of Microcast are also briefly traced. In addition, specifications and the physical and chemical properties of Vitallium Microcastings are given as an example of one type high melting point alloy used with this process.

The booklet is completely illustrated showing many castings of intricate shape and design which have been produced of high melting point, non-machineable alloys by Microcast. There is also a pictorial step by step description of the Process.

Metallurgical, design and mechanical engineers and production executives will find this booklet particularly valuable. A copy may be obtained, free of charge, by writing to Austenal Laboratories, Inc., at 5932 S. Wentworth Ave., Chicago 21, or 224 East 39th St., New York, 16.

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Operation of Safguard from press head provides additional safety in case of screw or other breakage.

Send for Circulars on Strand Sweep and Enclosure Safguards

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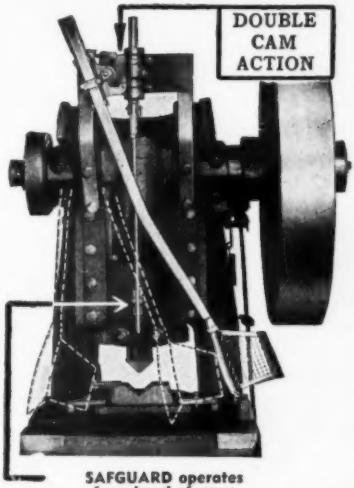


SAFGUARD operates from head of press

Model 25 Hi-Duty Marking Machine

AVOID RAGGED MARKING!

ROLL PART NUMBERS ON — QUICKLY AND ACCURATELY!

Requires only a fraction of the applied pressure normally used for stamping—Thus preserving piece parts and adding to the life of your dies.

RAPID SET-UPS

The economy of rolled markings is self-evident, due to its speed and ease of operation, and Hi-Duty machines are designed by us for practically any marking operation. Have you a tough marking problem? Send us prints or samples of parts to be marked—showing lettering, location and required production—We will be glad to make recommendations.

Designed and Built by

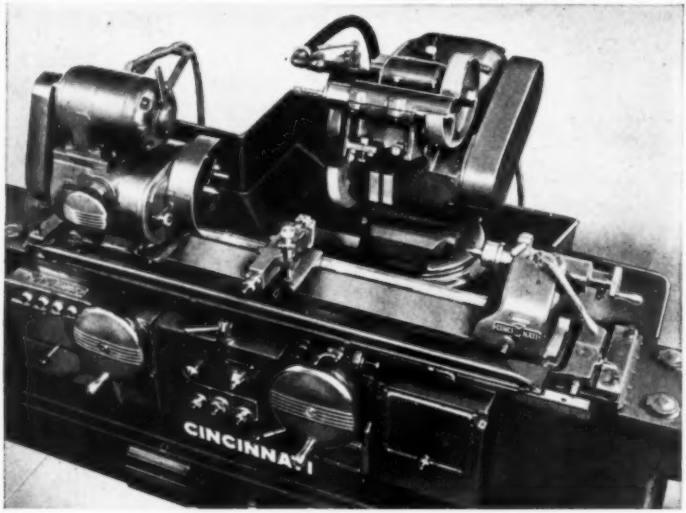
GTS

GEO. T. SCHMIDT, Inc.

1802 W. BELLE PLAINE AVENUE

CHICAGO • 13 • ILLINOIS

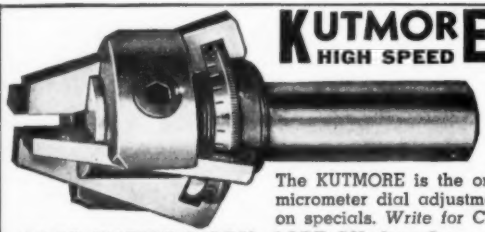
NEW HEADSTOCK FOR CINCINNATI GRINDING MACHINES



A new headstock, incorporating noteworthy improvements, has recently been applied to the line of Hydraulic Universal Grinding Machines built by Cincinnati Grinders Inc.

Of major interest is the adoption of a modified lathe standard spindle nose, which permits standard chucks and face plates to be mounted without intermediate adapters. Dimensions conform substantially to American Standards, sizes 5″ type B1 and 6″ type B1 (for 12″ machines and 14″, 16″ and 18″ machines, respectively), with these exceptions:—(a) the number of threaded holes for mounting chucks and face plates has been reduced to four, and (b) the taper is slightly smaller to assure a positive "squaring up" action of the chuck or face plate against the spindle flange. Fig. 1 shows the construction of the spindle nose with a face plate ready for mounting, while Fig. 2 shows the headstock unit with the chuck mounted in position.

Most live spindle work will be accomplished with a chuck or face plate mounted directly on the spindle nose. However, it may be desirable to remove



KUTMORE HIGH SPEED ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities 1/32″ to 2″. Also specials made to order.

The KUTMORE is the only hollow mill with built-in micrometer dial adjustment. Prompt delivery — even on specials. *Write for Catalog No.* 15.

CARL WIRTH & SON, 1625 Clinton Ave., N, Rochester 5, N. Y.

End Costly Error • Doubt • Worry and Production Delay

SPECIFY

BLACK GRANITE SURFACE PLATES .00005" ACCURACY

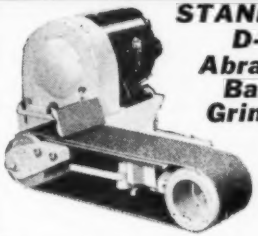
Rahn black granite surface plates cannot warp as a result of shock or temperature change. Neither can they rust. Dents from sharp objects raise no compensating bumps. The surface remains true longer than metal because granite is harder than hardened tool steel. There is no lapping trouble on instruments because abrasives cannot become embedded. *The highly finished black granite surface assures smooth action on moving instruments.*

Write for bulletin giving full information

Dealers and Manufacturers Agents — A few good territories are still open.

RAHN GRANITE SURFACE PLATE CO.
1149 PLATT CIRCLE · DAYTON 7, OHIO

STANDARD D-4 Abrasive Band Grinder



Famous for Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.
96 Warren St., New York, N. Y.

VIMCOLIGHT

is a WORKING TOOL

Proper lighting, like good tools, allows faster work with greater accuracy. **VIMCOLIGHT** is easily adjustable on any machine to eliminate shadows on those critical seeing areas. Machine operators deserve this tool for working comfort. No eyestrain . . . . no complaints.

On the spot lighting from any angle.

VIMCO MANUFACTURING CO. 109 CHENANGO ST. BUFFALO 13, N. Y.

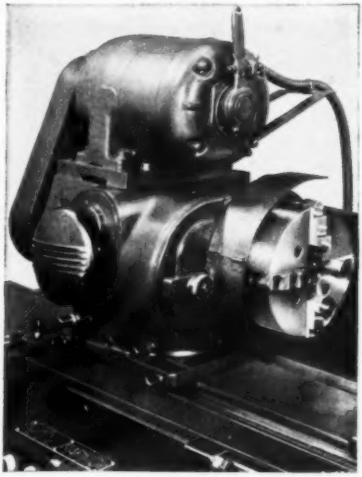
COMET

INTERNAL THREADING AND BORING TOOLS

For holes from ⅛" upwards, 15 different sizes. The accurate thread angle is maintained through each sharpening until tool is entirely worn down. Small head-long cutting surface for regrinding.

COMET TOOL CO.
738 B'way., New York 3, N. Y.

Write for Complete Data.



the work and chuck as a unit for inspection. An operation of this type may be accomplished with the "quick change" adapter applied to the chuck. Fig. 3 shows the adapter attached to the spindle nose, prior to mounting the chuck on it. The unit has the same dimensions as the spindle nose, and is provided with

CLOSED
TRADE AUTOM MARK
CLOSED
Plain Type
Offset Type
OPEN
OPEN

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

AUTO MOULDING & MFG. CO.
2326 S. CANAL ST
CHICAGO

SPECIFICATIONS:
Open Width 1/8" *to* 6"
Gage Material .040 *to* .125
Pin Diameter .101 *to* 3/8
Lengths to 120"

THREE-FOURTHS OFFSET.
SEMI-OFFSET

L-head bolts for clamping it thereto.

Another improvement is in the mounting of the spindle. It now runs on two precision adjustable anti-friction bearings, one at the front and one at the rear end, with a single accessible adjustment at the rear. In addition to the obvious advantage in convenience of adjustment for wear, a more rigid construction results, with very little overhang from the front bearing to the spindle nose.

Fig. 4 shows a three-quarter top view of the machine, with the standard drive plate for dead spindle work mounted in position.

Additional information, including a dimensional sketch of the spindle nose, may be obtained by writing to Cincinnati Grinders Incorporated, Cincinnati 9, Ohio. Ask for catalog G-486-3 for data on their 12" Hydraulic Universal Grinder or G-474-2 for data on their 14", 16" and 18" Hydraulic Universal Grinders.

COMPLEXITY OF MODERN WARFARE—The total number of electrical measuring instruments produced at the Newark (N. J.) Meter Works of the Westinghouse Electric Corp., for use by the armed forces in World War II was 3,239,547—enough to have provided each soldier of Gen. George Washington's Continental army with 13 if he could or would have carried them.

Immediate Delivery
FROM STOCK
GREAVES-SILENT BAKELITE GEARS

No waiting when you order Greaves Silent Bakelite Gears. • We have them in stock NOW! • Your order will go forward immediately. • You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. • You'll marvel at their great strength to carry big power loads . . . their remarkable ability to successfully operate completely submerged in water. • You'll welcome their low cost. • No metal reinforcements required. • Save Time . . . Money . . . Labor!

We also make silent gears of rawhide and Fabriol.

Write for Circular.

FOR OEMERS CUTTING THEIR OWN GEARS, WE CAN MAKE IMMEDIATE DELIVERY ON BLANKS SAWED TO SPECIFIED DIAMETER AND FACE

Greaves MACHINE TOOL CO.
2013-13 Eastern Ave.
Cincinnati, Ohio

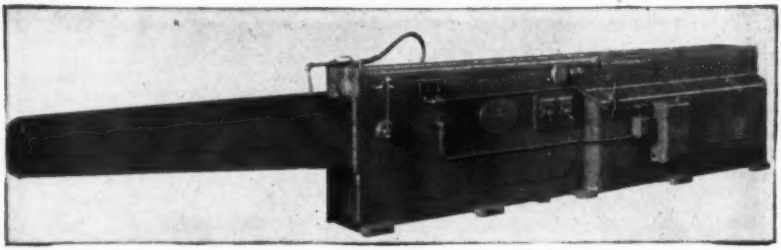
NEDCO
Electric
SANDING—RUBBING MACHINES
SOLVE YOUR SURFACING PROBLEM

Rotary or Oscillating types.

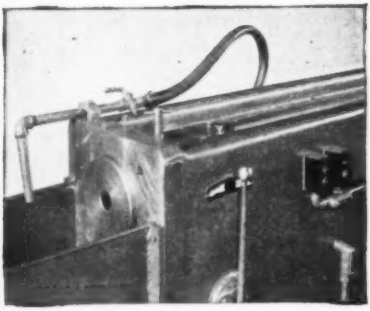
Write for circular.

THE NEDCO COMPANY
WALTHAM :-: MASS.

AMERICAN OFFERS NEW MODEL BROACHING MACHINE



A new type of horizontal broaching machine has been developed by American Broaching & Machine Co., Ann Arbor, Mich. Available in two models, known as the HD-15-66 and the HD-20-66, these machines are especially suitable for heavy duty internal broaching operations as well as many surface broaching applications.



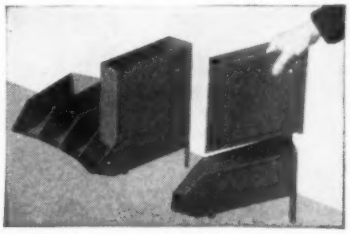
A unique feature is revealed in the design of the machine bed. It has been the practice in the past in the manufacture of horizontal broaching machines to use single wall cast iron or steel fabricated beds. These HD machines however, embody a rolled wall construction. This in effect provides double walls thruout the bed, lending greater strength and rigidity to the base.

Normal capacity of the HD-15 machines is given as 15 tons, with maximum capacity of 19 tons. Maximum stroke is 66″ and maximum broach length is approximately 72″. Broach speed is variable from 15 to 29 fpm; return speed is 41 fpm. Bore in face plate is 7″. Minimum distance, face plate to pull slide is 5″. Floor space required is 2¼ by 15 ft.—with outer support 2¼ by 24 ft. Net weight is approximately 9000 lbs.

Normal capacity of the HD-20 model is 20 tons and maximum capacity 28 tons. Maximum stroke is 66″ and maximum broach length approximately 72″. Broaching speed varies from 14 to 20 fpm. Return speed is 28 fpm. Floor space required is 2½ by 15 ft.—with outer support 2½ by 24 ft. Net weight is approximately 10,000 lbs.

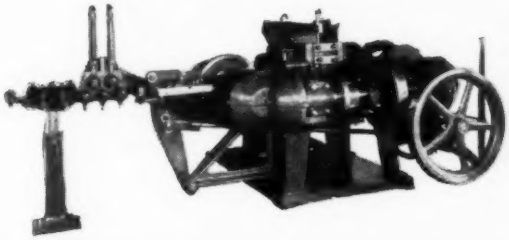
SPACE-SAVING HOPPER

In developing a hopper for its assembly bins, states the Stackbin Corp., Providence, R. I., traveling back and forth to replenish parts can now be cut as much as 75 per cent. The new hopper increases capacity of the assembly bin nearly four times, thus saving bench space, and also reducing costly interruptions in assembly work. Stackbin assembly bins are designed to keep every assembly part within easy reach of the worker's hands. Nesting together like Stackbins, they taper toward the front, so that when set up they are in the form of a semicircle. Sloping floors feed parts continually towards the front. This piece of equipment is made of heavy gauge sheet metal, with welded construction thruout. Finish is baked-on olive green enamel.



TO MEET *Today's* INDUSTRIAL REQUIREMENTS

THE NILSON AUTOMATIC METAL AND WIRE FORMING MACHINE



The Nilson Automatic Metal and Wire Forming Machine meets today's industrial requirements. Here are some of the features of this machine: Open construction of press and forming tools. Patented slide feed with an independent cam-operated wire gripping device. Power operating wire feed is transmitted through a straight line.

Write today for information

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

MEASURING A PLUG GAGE with LIGHT WAVES
using an optical flat, a toolmakers flat and a gage block

The formula is:

$$D = h + \left(.000012 \times N \times \frac{W}{w}\right)$$

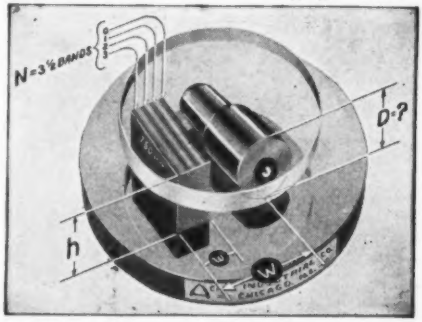
Substitute the actual values

$$D = .750 + \left(.000012 \times 3\tfrac{1}{2} \times \frac{1\frac{7}{16}''}{23/64''}\right)$$

and get the answer

D = .750168 inch.

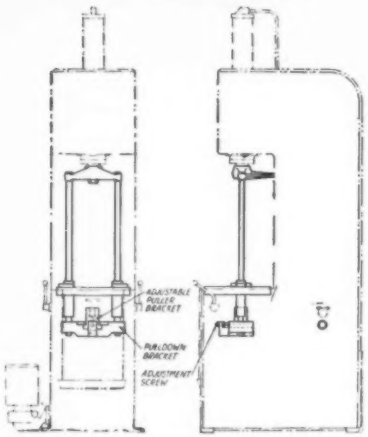
It's just that simple!



Write for new, free Lightwave Measurement Booklet.

ACME INDUSTRIAL CO.
SCIENTIFIC DIVISION
Makers of Standardized Jig and Fixture Bushings
210 N. Laflin St. MONroe 4122 Chicago 7, Ill.

ADJUSTABLE PULL HEAD



An adjustable pull-head permitting quick adjustment for off-center pull broaching on Colonial Utility broaching machines has been announced by Colonial Broach Co., Detroit 13, Mich. The device permits the ready broaching on these machines of such things as keyways which require an off-center broach puller. The pullhead is interchangeable with the pull-down attachment available for Colonial Utility as well as Colonial "Junior" presses. Adjustment of the puller bracket in and out is by means of a screw with locking nuts.

ARTHUR H. STARRETT HEADS L. S. STARRETT CO.

Arthur H. Starrett was recently elected President of this internationally known tool manufacturing organization.

Mr. Starrett, of the third generation, started with the Company in 1902, was appointed Master Mechanic in 1920, made a Director in 1922 and Vice President in 1939. He is on the Executive Committee of the Associated Industries of Massachusetts and the National Metal Trades Ass'n.

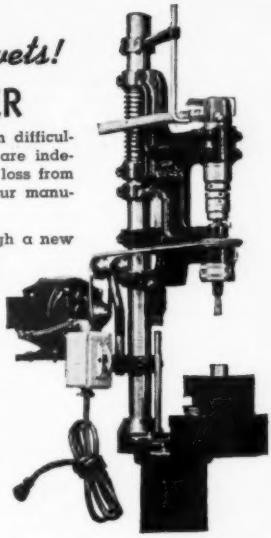
David Findlay, President of the Company for the past seven years, has retired after 55 years of service. Starting on the road in 1891 and doing much of the pioneer work of introducing Starrett Tools to the shops and the trade he became General Sales Manager in 1900 and served later as Director and Vice President. Like Mr. Starrett, he personally witnessed and had much to do with the growth of the business from small beginnings to its present eminent position.

William J. Greene, Vice President in charge of sales since 1941 has been elected Vice President and Director of Sales. Mr. Greene has likewise been long associated with the company, first as shop demonstrator in 1914, then successively sales representative, New York Branch Manager, Eastern Sales Manager, General Sales Manager and Vice President.

MODEL "G" STUDLER ANGLE COMPUTER — This latest model Studler Angle Computer is especially adapted for the layout of dies, tools, jigs, fixtures, patterns, and castings. Also for Inspection of parts, castings, etc. The actuating and locking mechanisms along with the three special protractors and verniers assure extreme accuracy. It is fully described in Bulletin No. 5, available from The Angle Computer Co., 1709 Standard Ave., Glendale 1, Cal.

The Answer to Cold Heading Unsupported Long Slender Rivets!

AIRFLEX SPINNER RIVETER

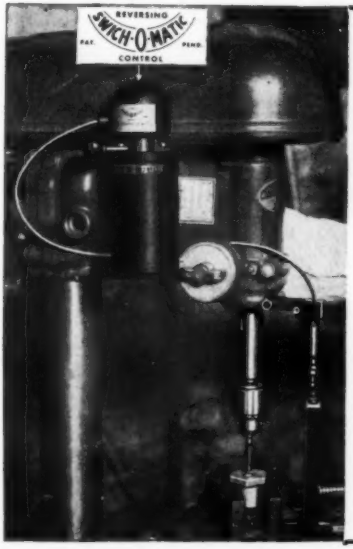


Check into your riveting operations. You may find production difficulties in the cold-heading of long slender rivets — when they are independent of lateral support from the parts being assembled — loss from breakage and spoilage of assemblies may be increasing your manufacturing costs.

The Airflex Spinner riveter is solving these problems through a new method of peening. The Airflex permits the use of a wide range of rivet materials — less ductile rivets such as stainless steel or monel can be used economically. You can rivet assemblies of fragile materials such as plastics, wood, fibre, glass, ceramics, enameled wear and insulating materials with a very minimum of spoilage.

Investigate the possibilities of using the Airflex. Send us your riveting problems for study and suggestions.

PLYMOUTH ENGINEERING COMPANY
PLYMOUTH, INDIANA
Manufacturers of KERN AIRFLEX EQUIPMENT



"SWICH-O-MATIC" REVERSING SWITCH CONTROL

FOR THREE PHASE MOTORS

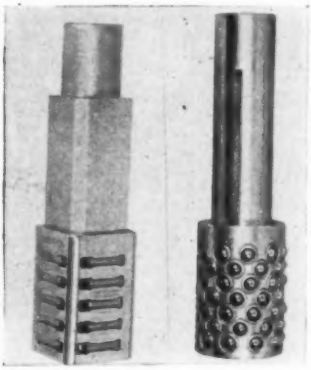
Replaces bulky tapping heads. Unlimited tapping capacity. Precision tapping without lead screws. Accurate spindle reversing on engine and turret lathes, all tool post and tail stock turret threading operations. Reduces costs — increases production. Adaptable to all industries where automatic precision reversing of equipment is essential.

Send for descriptive booklet and name of your distributor

READ MACHINE & TOOL CO.
4714 Huntington Dr., So., Los Angeles 32, Cal.
Telephone Capitol 1-3021

ANTI-FRICTION DIE SETS

To operate the new Lempco Punch Press at the extreme of speeds of which it is capable, it was necessary to devise a die set with guide pins that would not "freeze" because of the friction developed.



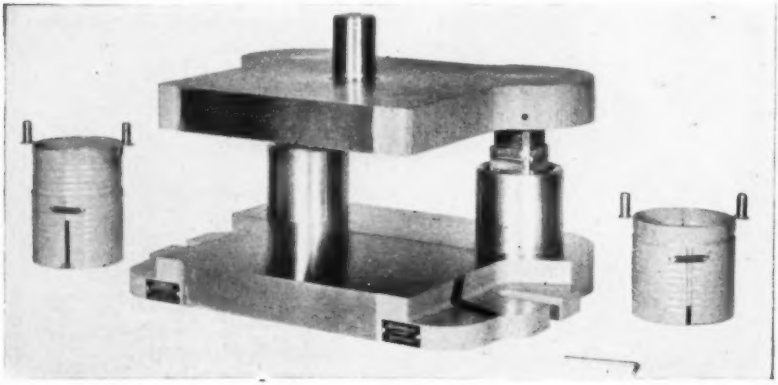
After several years of costly experimentation and thoro tests, two new types of die set guide pins have been originated. Altho originally intended for use on Lempco High Speed Punch Presses, they may be used to advantage wherever ordinary die sets are employed. The round pin style employs ball-bearings, and the square pin model utilizes roller-bearings. Both of these patented Lempco Anti-Friction Die Sets have been subjected to gruelling tests, which have established their practical usefulness.

A pre-load of .0015" was set up in both round and square pin models. After test runs of 18,000,000 strokes (which were made under more difficult than normal conditions), .0005" pre-load remained. This means the "play" between guide post and bushing is kept to an absolute minimum, which in turn results in considerably longer life for the die, and much greater production between die grinds.

Another important economy is effected by greatly reducing die-setters' time, since the Die Sets open and close freely by hand. No jacks, pry bars, or similar tools are needed.

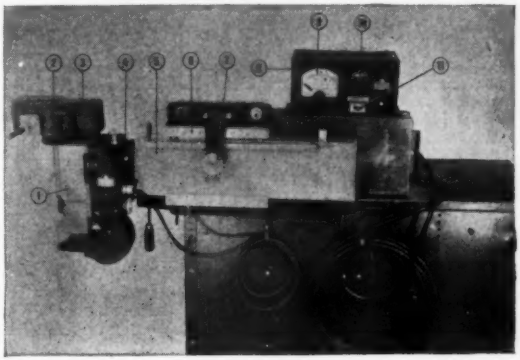
The Sets are precision-made to the most rigid standards of accuracy. Guide pin holes are located and bored on Jig Borers. Punch holder and die holder are matched, clamped, and bored in the same operation, so that alignment must be commercially perfect. The guide pins themselves are made of specially formulated wear-resisting alloy steel, hardened and ground to extremely close tolerances. All flat contact areas are precision ground to very fine finishes on Surface Grinders, inspected and checked until they are commercially perfect.

Six hundred of the most popular sizes of Lempco Anti-Friction die sets are now in process of manufacture. Literature is now being prepared and will be sent when completed to all who request it from Industrial Division, Lempco Products, Inc., 5729 Dunham Road, Bedford, Ohio.



P&W ELECTROLIMIT CONTINUOUS GAGE REMOTE CONTROL UNIT

A Remote Control Unit is announced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., for use with their Continuous Electrolimit Gage. Frequently, it becomes desirable and necessary to set the continuous gage from some other location remote from the gage. The P&W Remote Control Unit, when combined with the P&W Continuous Electrolimit Gage, will allow remote control operation.



The handwheel setting knob on the gage head is replaced by a reversing Selsyn motor and worm gear drive. The counter, which indicates gage setting on the head, remains undisturbed.

The Remote Control Setting Cabinet contains a Selsyn motor, counter, plus and minus toggle switch and an Indicating Meter. This unit is sturdily built and designed to withstand the punishment inflicted by a steel mill. The various parts are:— 1—Model D Continuous Gage Head; 2—Gage Head Counter; 3—Gage Head Selsyn Motor; 4—Cross Head; 5—Cross Slide; 6—Rail; 7—Sprocket for Overhead Slide Control; 8—Remote Control Cabinet; 9—Indicating Meter; 10—Cabinet Counter; 11—Plus and Minus Toggle Switch.

FONDA CARBIDE GAGE SET

Fonda announces production on its No. 82-C Tungsten-Carbide Set of gage blocks. This larger set of 82 pieces is comparable in quality in every respect to the 35-piece tungsten-carbide set recently introduced by Fonda.

Since the Tungsten-Carbide blocks are over 100 times more abrasion-resistant than are gage blocks made of steel, and outlast chrome-plated blocks, it may be said that for all practical purposes the tungsten-carbide blocks are immune to wear. Under normal shop conditions of service, they need never be replaced or recalibrated.

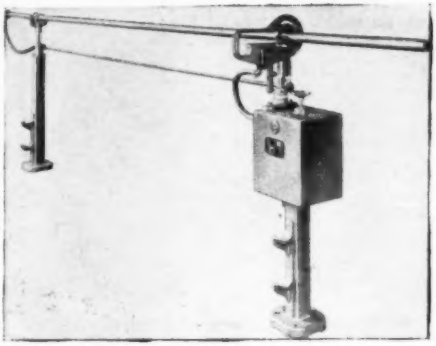
According to the makers, laboratory tests indicate that the extent of wear of steel blocks in four months' service is scarcely to be expected on Tungsten-Carbide blocks in less than some 33 years of continuous use.

In the 82-C set, block sizes range from .050 to 4". The set includes 9 pieces in .0001" steps from .1001 to .1009"; 49 pieces in .001" steps from .101 to .149"; 19 pieces in .050" steps from .050 to .950"; 4 blocks of 1, 2, 3 and 4" respectively; and 1 piece of .10005". Grades "AA" ± .000002", "A" ± .000004" and "B" ± .000008".

Inasmuch as this 82-piece set provides more than 480,000 combinations in wringing, as compared to some 84,000 for the 35-piece set, a user of the 82-C set can employ fewer blocks in wringing groups to the same measurement and can produce more combinations of the same size dimension. A considerable time and labor-saving also is effected, with a consequent speeding up of the work.

For fully descriptive bulletins on tungsten-carbide gage blocks, address Fonda Gage Co., 59 Daly St., Stamford, Conn.

PNEUMATIC BAR FEEDS

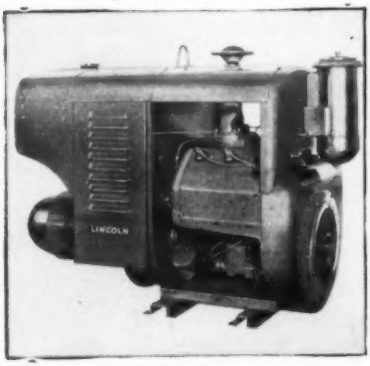


The Lipe Pneumatic Bar Feed, manufactured by Lipe-Rollway Corporation, Syracuse, N. Y., is now offered in additional sizes and new assembly designs. It is claimed for these units that the output of Screw Machines and Turret Lathes is increased on an average of 20%, as against the hand-fed machines equipped with feed fingers.

The Pneumatic Bar Feeds for Brown & Sharpe Automatics and small Hand Screw Machines are now furnished with newly designed pedestals, which offer several advantages. Control Cabinet has been moved to forward end of Feed Cylinder, adjacent to machine, where operator can make necessary adjustments without leaving his normal working position. The new pedestals have smaller floor bases and require less floor space.

Two new sizes for small Hand Screw Machines, Model 68, ½" Diameter x 12 ft capacity, and Model 100, ¾" Diameter x 12 ft have been added to the line; also a larger size, Model 500, capacity 4" Diameter, recommended for tubing or light metals, is now offered as standard. A new brochure fully describes the line.

SHIELD ARC, JR.



A new portable, low cost welder of the gasoline engine-driven type, is announced by The Lincoln Electric Co., Cleveland, Ohio.

This 200 ampere welder known as the "Shield-Arc Jr.", is of exceptionally compact design measuring 24x48x30" and weighs much less than the usual equipment of its type and size.

With a current range of from 40 to 250 amperes, the machine can be used for welding light or heavy gauge metal, for the repair of cast iron structures such as engine blocks, for the construction of various contrivances or the repair or fabrication of tools and machinery parts, and for hard facing of worn parts.

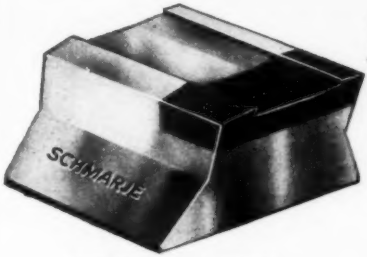
Provision is made on the output panel for three ranges of output current, continuous adjustment within these ranges being obtained by means of a simple speed control.

Generator controls are mounted inside an enclosed cabinet above generator, cooling being thru a fan mounted on generator shaft.

Power is supplied by a Wisconsin air cooled 4-cylinder V-type engine. Shrouds around engine fan and cylinders direct the cooling air. Speed of engine determines the welding current which is controlled by adjusting engine speed between a maximum of 2100 rpm (22 hp) and 1500 rpm (16 hp). This type of drive reduces weight and eliminates necessity of winter care of radiator. Equipped with a six gallon gasoline tank, unit will operate under normal welding conditions for approximately six hours before refueling.

The complete unit is protected from falling objects by a canopy or shroud which also affords protection from the weather.

Two transverse mounting rails for bolting to floor or platform permit welder to be mounted on either shop trailer or high speed road type two-wheel trailer.



SCHMARJE FORM TOOLS

CARBIDE FORM TOOLS

CIRCULAR - FLAT - DOVETAIL

Send Prints For Quotations

AGENTS WANTED — SOME TERRITORIES

ACCURACY Insured

By being ground on latest type optical form grinder.

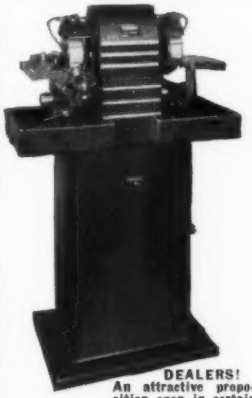
FINE FINISH

Resulting from grinding with diamond wheels.

LONG LIFE

Resulting from Strain-Free cushioned brazing.

SCHMARJE TOOL AND ENGINEERING CO.
MUSCATINE, IOWA



DEALERS!
An attractive proposition open in certain territories.

WILLEY'S NEW CARBIDE TOOL GRINDER

Willey's new 50-A Grinder is compact and designed for the rapid, economical grinding of carbide tipped tools as well as other types of tool bits that require keenest cutting edges and extreme accuracy. It handles rough, semi-finish and finish grinding of tool bits having up to 2" square or equal cross section area. Bronze bearing trunnions support the tool rest table ¾" below work center, permitting grinding tools from 3/16" to ¾" square *without further horizontal movement* — a Willey's feature that speeds production.

WRITE FOR FOLDER

Complete specifications and illustrations of this new Willey's Grinder Model 50-A.

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

P&W AIR-O-LIMIT COMPARATOR WITH ADJUSTABLE COMPENSATOR

To obtain higher magnification for the P&W Model B2 Air-O-Limit Comparator, manufactured by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., an adjustable compensator has been announced which can be readily attached to the Comparator.

The Adjustable Compensator allows full scale graduations of .0005, .0006, 0008, and .001" to replace the full scales of .002, .003 and .004" that are normally used.

In addition to the use of higher magnification, the Adjustable Compensator offers the further advantages of greater diametral clearance, better side compensation, longer wear life and greater speed at the higher magnification.

A special series of gaging plugs is required as the gaging plugs regularly used with the Comparator are not satisfactory for the Adjustable Compensator.

HANDLE-GRIP CONTROL

Illustrated is the new Handle-Grip control manufactured by Pneumatics, Inc., Flymouth, Ind., builders of air and hydraulic cylinders. Handle-Grip is the newest member of their ½", 4-way control series.

Pneumatics, Inc., states that this control contains a detention spring which permits the control to be fixed in either position.

Extremely compact, this valve is slightly over 5" tall, 4" deep, and 3" wide. It has full, unrestricted ports and is exceedingly fast in operation.

Other controls besides Handle-Grip, manufactured with the same body, are Cam, Palm, Foot, Pilot, and Solenoid.

"PUNCHING, SHEARING, AND BENDING"

An attractive 24-page reprint (bulletin No. 3586) has been issued by the Buffalo Forge Co., 161 Mortimer St., Buffalo, N. Y. This interesting and helpful publication combines three stories which appeared recently in the MACHINE TOOL BLUE BOOK on these three subjects, on which few articles have been published. The author is William C. Tucker, Assistant Chief Engineer of Buffalo Forge's Machine Tool Division. He has had a vast amount of experience in these particular fields and is well qualified to give helpful advice and technical assistance. Copies of the bulletin will be sent free of charge.

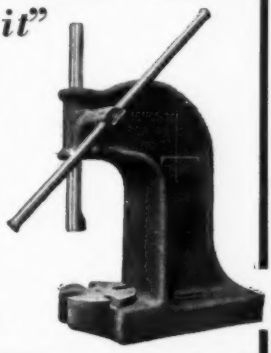
SALSBURY CLUTCH FOLDER

Salsbury Motors, Inc., 4464 District Boulevard, Los Angeles 11, announce the availability of Bulletin No. 4501 describing in detail their new automatic clutch. Designed for operating loads up to 6 hp, this clutch operates smoothly and easily, absorbs momentary overload, eliminates starting shock and arrives quickly at driving speed.

All **5** *Sizes of Nicholson*

ARBOR PRESSES can

"take it" and "give it"



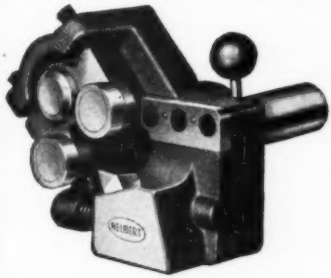
Their ruggedness has been proved by years of use in shops the nation over. 5 sizes: for arbors and shafts up to 3"; take work from 5¾" to 20" diameter; exert pressures from 2,600 to 8,200 lbs. Bulletin 845.

W. H. NICHOLSON & CO.

117 OREGON STREET, WILKES-BARRE, PA.

Makers of Famous Nicholson Expanding Mandrels

THE NEUBERT BAR TURNER



1"

Write for circular.

IS THE BEST TIME SAVING TOOL USED ON TURRET LATHES AND SCREW MACHINES SET UP FOR BAR WORK. REMOVES LARGE AMOUNTS OF METAL QUICKLY AND PRODUCES WORK THAT IS SMOOTH AND ACCURATE.

CUT YOUR PRODUCTION COSTS WITH ROLLER TURNERS.

Immediate delivery

⅛ to 5/16" capacity, 5/8" shank	$ 68.00
3/16 to 1" capacity, 1" shank	85.00
3/16 to 1" capacity, flange type	85.00
3/8 to 1¾" capacity, flange type	110.00

NEUBERT MACHINE COMPANY

Precision Cutting Tools 341 W. Willow, Long Beach 6, Calif.

LE MAIRE SPECIAL PURPOSE MACHINE

A new special purpose machine utilizing five standard hydraulic power units and one lead screw tapping unit has been designed and built by LeMaire Tool & Mfg. Co., Dearborn, Mich.

It drills, reams, bores, counterbores, chamfers, and taps wheel cylinders all at one setting at a rate of approximately 840 pieces an hour.

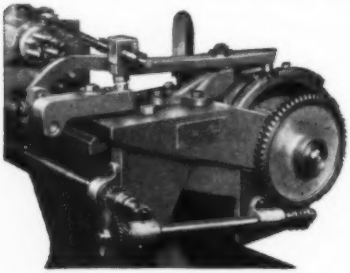
By having all these operations performed while the part remains in fixed position in the fixture, the manufacturer claims that greater accuracy in finished parts can be achieved.

Four parts are held at one time in each fixture by being clamped by air cylinder and are released by cam rail. Brackets mounted on each end of fixture contain two bushings which nest pins on bushing plates of drill units and head of tapping unit to assure positive alignment.

The machine itself is composed of five LeMaire No. 2000 self-contained hydraulic drilling units and one LeMaire No. 150 lead screw tapping unit mounted at various angles on a fabricated base which supports a 7-station 54" diameter automatic index table. The cycle of operations includes:—Station 1, loading and unloading; Station 5, drill deep holes; Station 6, combination counterbore and for 118° seat; Station 7, tap.

A.K. TOOL TAKES OVER NEWTON PRODUCTS

The A. K. Tool Co., precision machine and tool makers, announces purchase of patents and manufacturing rights of the Newton Co., makers of the Newton Automat which converts hand-operated turret lathes into reliable automatics, the Newton Bar Feed, the Newton Hole Cutter, and the self indexing turret.



Experiments are now being made to improve and modernize the various Newton Products at the factory of the A. K. Tool Co., 2029 Blake Ave., Los Angeles. Production will proceed according to schedule in the near future.

BEHR-MANNING LABORATORIES

A new 8-page booklet, "Your New Laboratory, Sir", is offered by Behr-Manning Corp., Division of Norton Co., Troy, N. Y.

The booklet announces a pioneering service in the coated abrasives industry, namely provision of branch located Methods and Equipment Demonstration Rooms for industrial customer use in pre-testing their grinding, sanding and finishing tool-ups on standard commercial equipment, without disturbing their plant production schedules. Shown in this booklet are random photographs of Behr-Manning Demonstration Rooms in offices at St. Louis, Chicago, Boston, Cleveland, Detroit and Troy.

Announcement is likewise made of forthcoming openings in branches at Philadelphia, High Point, Los Angeles, New York and Cincinnati, with plans for installations in other branches well underway and awaiting only the availability of floor space and equipment.

Facilities for arranging immediate use of these centrally located laboratories by tool engineers, methods engineers, plant superintendents, industrial supply distributors and others are provided in the booklet.

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

BEWARE OF IMITATIONS!

Our machine carries the Butterfly trade mark.

HARVEY MFG. CORP.

161 GRAND ST., NEW YORK

Phone CAnal 6-5170

Registered U. S. Patent Office

THE *New* DEARBORN MODEL "B" CHUCKING and INDEXING FIXTURE

FOR USE ON MILLING MACHINES

The Dearborn Fixture meets the demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting. Its simplicity of design, high precision, milling accuracy and speed of operation has led to its adoption by many of the leading manufacturers thru-out the country.

Work held by automatically opening and closing collets Work automatically ejected Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces

Write for Folder

J. W. DEARBORN ANSONIA, CONN., U. S. A.

SIMONDS TRADE MARKS

New trade marks are now being used by the Simonds Saw & Steel Co., and its affiliated companies, Simonds Canada Saw Company Ltd., Simonds Steel Mills at Lockport, N. Y., and Simonds Abrasive Co., Philadelphia. Design of the new trade mark is basically the same for all four companies, the only variance being the name of the particular company appearing on the mark. This new mark is one outward sign of the close cooperation between these several units of the parent company.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

SIMONDS
CANADA SAW CO. LTD.
MONTREAL TORONTO VANCOUVER
SAINT JOHN, N.B.

SIMONDS
STEEL MILLS
SIMONDS SAW AND STEEL CO.
LOCKPORT, N.Y.

SIMONDS
ABRASIVE CO.
PHILADELPHIA, PA.

Simonds has been a leading producer of cutting edges for industry for the past 114 years. Its record is that of one family and one company since its founder, Abel Simonds, began manufacturing scythes in 1832.

From the time the business was founded up to the present day, the company has constantly expanded, always being alert to the ever-changing demands of the times. The business is now conducted by the fourth generation of the Simonds family, with Daniel Simonds as President and Gifford K. Simonds, Jr., General Manager.

One example of the broad vision and sound management policies of the company is the fact that in 1939 Simonds began operations in the country's first controlled-conditions factory, a windowless plant with straight line production and air, light, heat and noise control.

During the extreme demands of three-shift production for World War II the company's plant facilities, equipment and methods were brought up to date in every detail to meet the exacting requirements of war production in wood and metal working plants thruout the world.

The know-how and experience gained during the war years, plus the new materials and new methods of manufacture which have been developed, will work to the advantage of the company and its customers and result in better ways to make better cutting edges to meet today's highly competitive fields.

CARBIDE TIPPED DRILLS

Information concerning a Carboloy-tipped twist drill that tripled production for one company has been revealed by the Nelco Tool Co., Inc., 370 Hamilton Ave., Brooklyn, 31 N. Y., manufacturers of Carboloy-tipped cutting tools.

This drill permits faster cutting of plastics, ceramics, cast iron and bronze. Unlike steel drills which dull rapidly when used on such abrasive substances, the Carboloy-tipped product has an extremely long life. Efficiency is increased because Nelco grinds drills to suit the material to be cut.

Properly ground carbide-tipped drills can be used on glass and other materials which are too hard for steel drills. Altho holes can be drilled in heat-treated steel, the manufacturer does not recommend it as a production job.

A descriptive folder is available on request.

ELINCO MOTOR CATALOG

Elinco Catalog "FB" is a new two-color brochure offered free of charge by Electric Indicator Co., Stamford, Conn., manufacturers of precision fractional horsepower motors and generators.

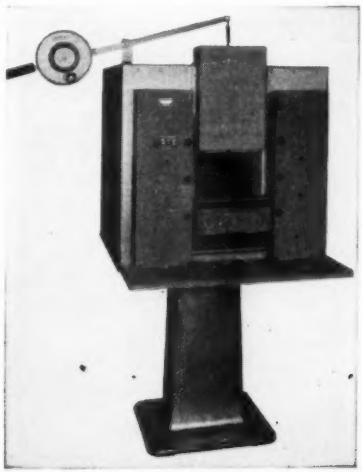
This booklet describes in detail, typical Elinco units in the "FB" frame, designed to allow both base and frame mounting. Permanent-Magnet a-c and d-c Generators, Split-Field a-c Motors, Permanent-Magnet d-c Motors, Series and Universal Motors, and Shunt-Wound d-c Motors are pictured and described in detail.

LARGER SIZE SENTRY

The Sentry Co., Foxboro, Mass., announces a new and larger size to be added to their line of Model "Y" high speed steel hardening furnaces. Known as Size No. 5 it will have a muffle chamber 7" high x 8-7/8" wide x 20" deep. Thru use of larger sizes of Sentry Diamond Blocks, high speed steel tools up to 5"x7"x14" maximum size can be hardened completely free from scale or decarburization—a much greater work capacity than heretofore available.

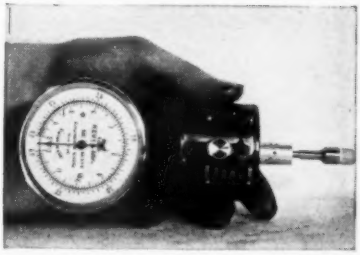
Several design innovations are incorporated. Heating elements are located front to rear alongside the removable muffle chamber. Heating element terminals are the same patented reliable air cooled type as used on other Model "Y" furnaces. The furnace heating chamber is designed to reflect heat toward the muffle chamber opening to offset the tendency to cool at this point. Terminals and electrical connections are shielded and protected by removeable metal guards. The furnace is rated at 42 kw maximum and can be directly connected to 220 volts, 3 phase supply without a transformer.

The new furnace is supplied mounted on a cast iron pedestal. Overall dimensions, not including door lever arm, are 36" wide, 48" deep and 68" high with the hearth 46" above floor.



SCHERR TACHOMETERS

George Scherr announces a new precision hand tachometers to enable engineers to read accurately the rpm of any revolving equipment, operating on the centrifugal principle. The new models have five speed ranges covering an extremely wide range.



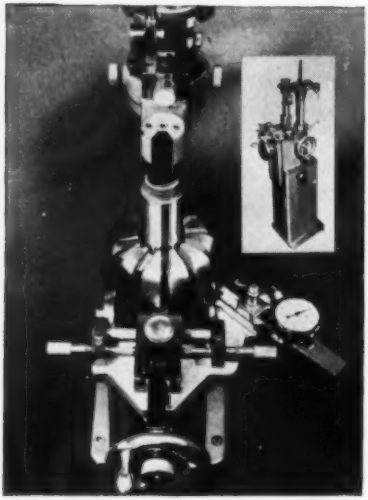
To change speeds, Scherr provides a knurled ring for speedy shifting. The four models are:—Model A from 30 to 12,000 rpm; B from 45 to 18,000 rpm; C from 60 to 24,000, and D from 120 to 48,000 rpm. It is thus possible to obtain the speeds of generators, combustion engines, belts, elevators, transmission pulleys, power plants, textile machines, pumps, lathes, etc.

Scherr Tachometers gain their extreme precision from the fact that each dial is individually calibrated for each instrument. In the Model A, the hand reads to 1 rpm and fractions of one revolution may be estimated. In the 100 to 400 range each graduation represents 5 revolutions; in 300 to 1200, ten revolutions; in the 1000 to 4000 range each line is 50 revolutions while in the 3000 to 12000 range each graduation is 100 revolutions. Attachments are also provided to give feet per minute readings.

It is claimed by the manufacturers that with the precise graduations on these tachometers, much closer results can be obtained and production and profits increased by even small percentages, not possible with ordinary revolution counters that do not permit such close readings.

Write the George Scherr Co., 198 Lafayette St., New York 12, N. Y., for complete information.

FORM TOOL CHECKER



Originally available exclusively for the checking of tooth spacing and hook or rake angles on thread milling cutters, a simple type of "hook checker" developed by Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich., is now available for universal checking of all types of form-relieved tools. Such relieved-form tools can be checked for sharpening accuracy on this universal tool checker, it is claimed, without use of gage blocks, surface plates, vee blocks, indicator stands, etc., for setting up different sizes and types of tools. It is thus ideally adapted for use both in large centralized tool grinding departments and in small shops.

The checker is of the visual alignment type. Circular form tools, thread buttons, gear cutters, hobs, reamers, and form relieved milling cutters are some of the cutters which can be checked by simply placing cutter between the adjustable centers and bringing the ground knife edge against cutting face of tool until you can't see light between the two. An integral micrometer barrel indicates the exact offset distance of the cutting face from center line of tool. Reference to a simple table supplied with machine quickly converts this reading—if desired—to rake angle for diameter of tool being checked. Flute spacing checking is just as easy. Simple master index plates are interchangeable for cutters having different numbers of flutes or gashes. To check spacing, the built-in indicator is set on "zero" against one face. The tool is indexed from flute to flute. Indicator reading shows accuracy of spacing.

"KAM-GRIP" DRILL JIGS

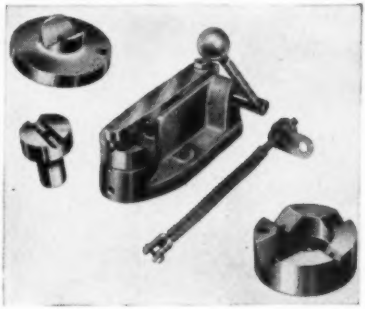
A versatile new drill jig has been developed by Manufacturers Engineering Service, Inc., 415-6 Security Bank Bldg., Toledo, Ohio.

Simple and sturdy in construction, a cam-operated lever mounting the drill bushing, grips the work securely against an anvil. Additional sets of anvils and bushings are available to cover a wide range of sizes—for example, as many as 16 different combinations of anvils and bushings. Standard models accommodate from 1/8" to 7/8" stock and special models are available for larger sizes. Bushings are available in all standard drill sizes and are quickly interchangeable.

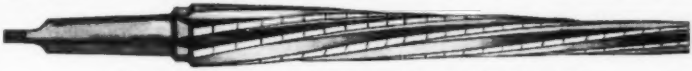
Actuating lever can be operated manually or by drill press quill, thereby making the jig operation automatic. While standard models are designed to handle round stock, special anvils are built to accommodate square, flat or hexagon stock.

A deep groove milled in shoulder of drill bushing makes ample provision for coolant and chip clearance.

Stock can be fed from the front when hole is to be drilled within ½" from end of stock. Models 52 and 65 can be loaded from the side as well as from the front. By using the side feed adjustment and side feed depth stop, holes can be drilled any distance from end of stock.



BOAT BUILDERS TAKE NOTICE!!



PROPELLER REAMERS

This special Reamer reams the tapered hole in marine propellers. It has the following outstanding features:

1—Tapers ¾" per foot.
2—Left hand, spiral, odd number of flutes. This gives a smooth shearing cut, does not damage keyways and eliminates chattering.
3—Flutes are notched. This breaks up chips and releases drag on cutting edge.
4—Morse taper shank for use in drill press or lathe.

No.	Dia. Small End	Dia. Large End	Shank Size Taper	Overall Length	Price Net
0	½"	1"	No. 2	12"	$ 8.95
1	⅝"	1½"	No. 3	16½"	15.00
2	1¼"	2"	No. 4	18"	23.00
3	1½"	2½"	No. 4	22"	40.28

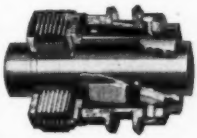
Send for our general catalog on small tools and machines.

TRAVERS TOOL COMPANY

5 COURT SQUARE **LONG ISLAND CITY 1, N. Y.**

Specify **ROCKFORD PULLMORE MULTIPLE-DISC CLUTCHES** *For*

COMPACT DESIGN
HIGH TORQUE
HIGH-RATIO LEVERS
POSITIVE NEUTRAL
PRECISION BUILT
LONG WEAR LIFE
EASY ADJUSTMENT



One-point adjustment, by hand, of ROCKFORD Multiple-Disc CLUTCHES is simple, easy—and ample to maintain uniform operating conditions under long, hard usage. Unaffected by centrifugal force, PULLMORE clutches are convenient to operate and are positive in driving, braking and neutral action.

SEND FOR THIS BULLETIN ON POWER TRANSMISSION

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning postwar products.

PULLMORE CLUTCHES

ROCKFORD CLUTCH DIVISION
BORG-WARNER
1309 Eighteenth Avenue, Rockford, Ill.

SPEEDS PRODUCTION DRILLING

A new type drill designed for "hyper-drilling" (greatly increased speed in mass production drilling far beyond present practices) has been announced by the Republic Drill & Tool Co, 322 So. Green St., Chicago 7, Ill. Laboratory tests and actual production drilling are said to indicate tremendously faster penetration and greater hole accuracy with this new type drill which Republic has named the "Jet" drill—and its accompanying "Jet" director. Stop-watch timing during test drillings have shown an elapsed time of only eight seconds in drilling a ⅜" hole, 4" deep.

Republic ascribes the remarkable performance of the new "Jet" drill to three factors. First, the use of a great volume of coolant under high pressure. Second, high spindle speeds and feeds. Third, an entirely new principle in drill design.

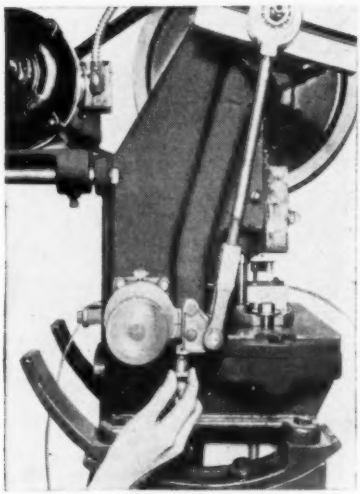
The "Jet" drill was demonstrated at the National Metals Show in February and will be shown again at the A.S.T.E. Show in April.

A comprehensive booklet (J-1) giving design and performance details is available.

PETERSON FRICTION FEED UNIT

The Carl G. Peterson Co., 9 Warren Ave., East Providence, R. I., announce a new type Friction Feed Unit for Power Press applications.

An outstanding feature is the patented micrometer adjustment for close tolerance work. Illustration shows adjustment being made.



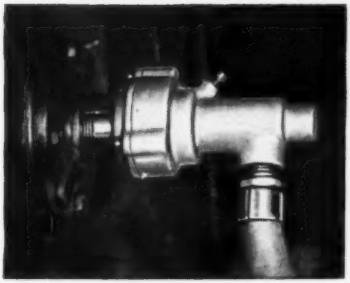
The Feed operates on the principle of the V-Belt Drive, having a V-Band which fits the V-Housing, thus allowing a 360° contact when the gripping action occurs. Peterson states this is a feature that no other Friction Feed Unit offers. Gripping power is controlled by an adjustable, self-aligning, metallic brake, assuring positive brake action.

The Feed can easily be taken up for wear and has proved equally successful in feeding light and heavy work. A slight mechanical adjustment permits operator to feed in reverse. Application is simple, as the unit can be securely fastened to feed rolls.

OPTIMUS FLOOR CLEANER

Optimus Floor Cleaner No. 1F10 has been announced by Optimus Detergents Co., 156 Church St., Matawan, N. J. It is a heavy duty floor cleaning compound, especially compounded for use on cement, Terazzo or tile floors.

Altho effective in removing oil, grease and other dirts from the surface, it is claimed this material does not harm the finish in any way. In fact, it is said that regular washings help to keep floors in good condition, making them less porous, keeping them from dusting as well as whiter and cleaner.



The Deublin Union, a new type rotating water joint, for cooling revolving shafts, cylinders, or drums, has been announced by the Deublin Co., Northbrook, Ill. The union will also efficiently handle liquids for heating up to 200°F.

Leakproof, corrosion proof, frictionless, and more sturdy, the Deublin Union utilizes a helical groove on the rotor which runs counter to the direction of rotation. The sweeping action of the helix prevents leakage between shaft and housing as well as keeping foreign objects from lodging between the two surfaces. Precision machining leaves maximum clearance between shaft and housing of .0005". Rotor concentricity is held to .001" total indicator reading.

Rotor is machined of stainless steel which provides over three times the tensile strength of cast shafts. Housing is of bronze. Both rotor and housing resist the corrosive action of water, brine, and other similar liquids that may be used for cooling or heating.

Standard, sealed, "lubricated-for-life" ball bearing provides almost frictionless freedom of movement. Wobble is eliminated by special tooling of threads which are concentric in relation to bearing surfaces.

The Deublin Union is made in two types:—Monoflow and Duoflow. Four standard sizes are available in both types, but because of the basic design of the union, any size can be manufactured from ¼" pipe size to 6".

Bulletin D-10 will be sent on request.

Libert Hi-Speed SHEAR

CIRCLE CUTTING ATTACHMENT Included as STANDARD EQUIPMENT with this Machine

MODEL 1236
36-in. throat.
12-gauge capacity.

WRITE FOR BULLETIN

SIMPLIFIES Maintenance
SPEEDS Production
SAVES Manpower

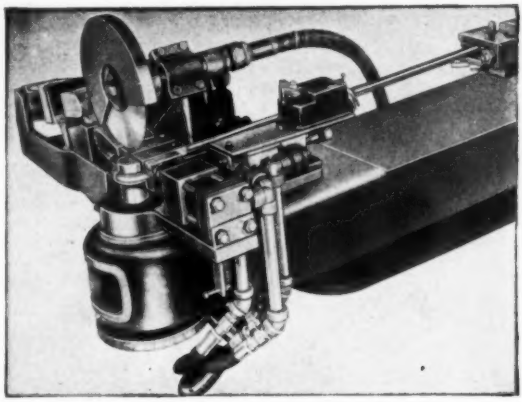
In wartime work, the *Libert* has amply proved its advantages by turning out top production —shearing flat or formed sheet metal, internal or external, plain or irregular shapes *rapidly, accurately, cleanly!*

Equally effective in maintenance work, *Libert* is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

Sizes up to 60-in. throat, 10-gauge capacity.

LIBERT MACHINE COMPANY
Green Bay, Wisconsin

AUTOMATIC CUT-OFF FOR PINES BENDERS

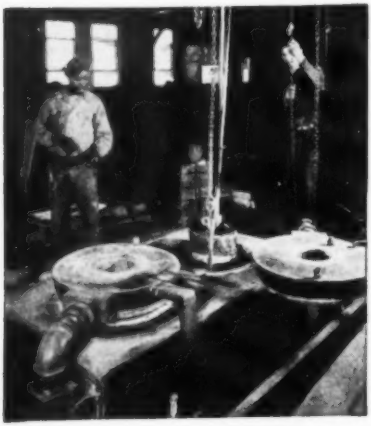


Pines Engineering Co., Aurora, Ill., announces an Automatic Cut-Off for all six sizes of Pines Automatic Tube and Pipe Benders which handle tubing from ¾" to 5" O.D. and Pipe up to 4" O. D.

The No. ¾ Bender illustrated is equipped for full automatic manufacture of return bends or elbows. The machine uses the Pines patented Booster Attachment for tube feed and the automatic cut-off attachment.

In operating the bender, a long piece of tubing is placed over the mandrel and the "start" button pressed. After machine finishes the bend, the mandrel is extracted and before the clamps are opened, the saw is passed thru the tube by means of hydraulic power. The bending arm then returns and the mandrel advances. The tube is then fed automatically and the operation repeats. The machine continues to operate automatically until the tube is used up.

Typical production is 650 pieces bent and cut per hour from ¾" copper tubing, bent on a 1¼" center.



TOP-FIRED CRUCIBLE FURNACE

A top-fired crucible melting furnace, using two crucibles (fired with gas or oil) in tandem, is offered by Radiant Combustion, Inc., of Warren, O. This new furnace holds two crucibles, loaded at all times and alternately fired.

While the gas or oil flames are heating the first crucible, all of the flue gases produced are carried by a connecting flue to the second chamber to preheat the second crucible. During the pouring of the metal from the first or fired crucible, a third crucible replaces the removed crucible to receive cold metal. The covers are cam lifted and swung backward independent of one another. Crucibles can be had either in the stationary or tilting types.

PEN KOTE 500 PAINT

Complete information on the new Pen-Kote 500 chemical-resistant maintenance paint is given in an illustrated bulletin by Peninsular Chemical Products Co. 6795 East Nine Mile Road, Van Dyke, Mich.

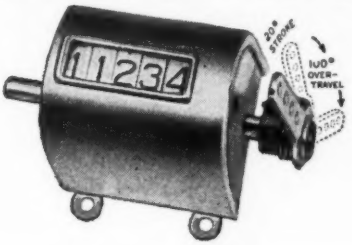
Illustrations of typical jobs show how this quick-drying, odorless protective coating is applied to heated, wet and porous surfaces of all kinds. Unretouched photographs of test strips demonstrate the protection provided by a single coat of Pen-Kote against hot acids, alkalis and water. Other distinctive features are explained in detail.

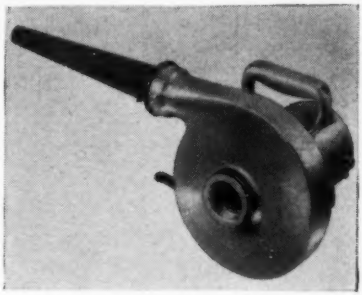
COMPACT STROKE COUNTER

A small, rugged non-reset stroke counter with built-in protection against overtravel of the operating arm is announced by the Production Instrument Company, 704-14 W. Jackson Blvd., Chicago 6, Ill.

The operating arm works against a coil spring which permits the arm to continue beyond the full stroke without injury to the counter. The arm may be installed on either side of the counter and set at any angle.

The Counter is completely enclosed in a tamper-proof case which, combined with small size, adapts it for built-in applications. The five large number wheels register to 99,999 and repeat.





ACE PORTABLE BLOWERS

Ace Portable Electric Blowers are made by The Ace Co., 12-40 N. Orange St., Ocala, Fla.

Four models are available. All are equipped with universal motors, polished aluminum casings, sealed ball bearings, 3-wire rubber covered cord and grounded housings. A bulletin gives full details.

IT'S A DATE—

SEE

THE BUFFALO
TORQUE CONTROL COUPLINGS
in actual operation

SPACE No. 1810
CLEVELAND ASTE EXPOSITION
April 8-12

If you plan to attend the ASTE Show at Cleveland from April 8-12, you are invited to visit our booth to see the Buffalo Torque Control Couplings demonstrated under actual working conditions.
Let us show you how these couplings will prevent drill, tap and reamer breakage or how they can be adapted to your special requirements.

Ask for descriptive Bulletin No. 1007

BUFFALO MACHINERY CO., INC.
838 Grant St. Buffalo 13, N. Y.

NUMBERALL BENCH PRESS

Numberall Stamp & Tool Co., Huguenot Park, Staten Island 12, N. Y. announces a versatile new Bench Hand Toggle Press, Model 97, for numbering, marking, and stamping.

It exerts a high pressure up to 10 tons. Seven ¼" characters, or 14—⅛" characters can be sunk into mild steel and, more characters into softer material.

The Company's regular Numbering Machines or Type Holders can be used in this press.

Other attachments are also available such as:—cut off shears, which will cut off strips 1/16" thick; a wire cut off up to ¼" thick steel wire and a punch and die for making tags with holes. All these tools are quickly interchangeable.

Frame total height is 14"; space between frame head and top of table—adjustment down is 3¾"; size of table, 4" wide X 6" deep; bench space required, 11" X 5".

MORE JOBS

The American Society of Tool Engineers "New Era" Exposition, scheduled for April 8 to 12 in Cleveland's Public Auditorium, has been planned with the express intention of demonstrating the contention that the creation of more jobs is inseparably linked with better tool engineering.

"Full employment is of vital concern to the entire nation," states C. V. Briner, ASTE President, "for it is one of the very cornerstones of our economy. A high level of production automatically brings a high level of employment, and assembled in this show will be an array of industrial equipment capable of instituting and maintaining an era of great productivity.

"Competition and profit are the main driving forces of industry's constant striving to offer better things at lower cost to more people. Mass production, the special province of the tool engineer, has followed this route in producing the highest standard of living the world has ever known. Devising feasible means of producing more goods at prices within the average individual's purchasing ability is the prime objective of tooling.

"As effectively engineered tooling increases production and cuts manufacturing costs, product prices scale downward, larger segments of the population enter the market, sales volume spirals upward and a rise in gainful employment closely follows the sales trend. Most industrial leaders are in complete agreement that this is the way—and the only way—to full employment." Briner concluded.

The New Era Exposition will present a resume of the most important technical advances of the war spurred years and will cover comprehensively all fields related to production. Leading manufacturers of tools, materials handling equipment, control systems activated by pneumatic, hydraulic, electrical and electronic means, coolants, lubricants and inspection instruments have currently reserved approximately one-half of the exhibit space. A floor plan of the Auditorium, indicating show areas not already reserved, may be obtained from ASTE headquarters, Penobscot Building, Detroit 26, Mich.

QUICK-ACTION VERNIER CALIPERS

Amic Precision Vernier Calipers have a fast-growing baby brother—the Amic Quick Action Vernier Caliper.

This tool is a favorite one with toolmakers and machinists in Europe. Amic "Quick Action's" perform much of the measuring which usually requires many tools. Inside diameters are as quickly and directly measured in thousandths, as are outside dimensions. Depth measurements up to 5" are recorded on the same direct-reading scale. Direct thread measurements may be obtained because a beveled edge permits the jaws to get into the thread. The tool features a one-piece sliding member with completely open face.

Amic presents these tools in both stainless and tool steels, and with every tool, supplies an attractive, tough leather case, so that it may be conveniently carried in the craftsman's pocket.

REVERSIBLE GAGE SETS

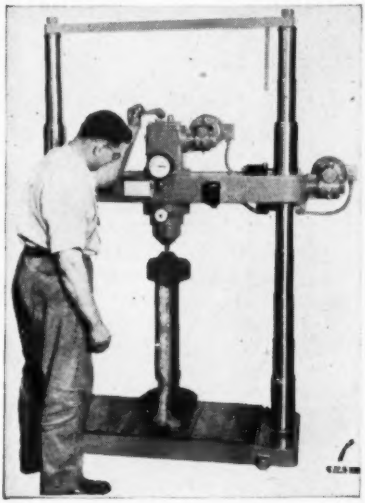
The Size Control Division of the American Machine & Gage Co., 4636 W. Fulton St., Chicago 44, Ill., has announced a complete line of standard reversible gage sets in cabinets. Thread gages are available in Size Control (patent pending) reversible type giving two or more gage members for the price of one. They are made up in partial or complete thread series in storage and carrying cabinets, with each plug hole properly identified.

Plain plug gages, of Size Control make, also of reversible design, are available in the old or new ASME recommended drill sizes, also in fractional sizes in any combination of increments of .001 or by any other size arrangement.

Standard thread or gear wire sets in any recommended series made to Bureau of Standard specifications also are available from stock. These sets are of special value in experimental laboratories, or shops requiring gaging of many different short run operations.

BRINELL TESTING

A machine for the Brinell testing of heavy and hard to handle specimens, is announced by the Steel City Testing Laboratory, 8843 Livernois, Detroit 4, Mich. A hardened steel plate on the base of the machine provides proper foundation for testing and is only 3″ from the floor. It is identified as Type A-4 and can be set-up in an assembly line or any other position to suit the test requirements. Cross head motor is operated with a reversible switch which is located for convenient operation. Pressure upon the Head is hydraulically operated. It comes equipped with either standard Brinell microscope for reading diameter of impression, or with direct reading attachment. Type A-4 is furnished with overload protection—screws have collapsible covers. Available are two sizes—3′8″ between standards for testing specimens 51″ (maximum) in height and 22″ between standards for testing specimens 24″ (maximum) in height.



ELECTRIC FEEDRAIL BULLETIN

A new bulletin (No. 17) presents the Electric Feedrail for machine tools, made by The Feedrail Corp., 125 Barclay St., New York 7, N. Y.

Typical installations are shown on big heavy duty lathes, boring and honing machines, etc.

Feedrail consists of a system of enclosed electric rails and trolleys for portable motors, lights and other moving electrical equipment. Mounted close to the machine beds, it furnishes electrification at moving carriages for grinders, lights or traverse power. It eliminates dragging or bending wires, exposed trolleys and poor contacts. It operates equally well in horizontal or vertical positions.

Accessories available include cable connectors, receptacles, plugs and midget fusible plugs.

ANNOUNCING!

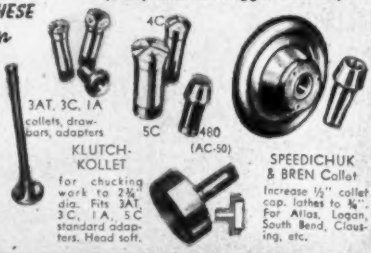
THE NEW Precision LINE OF COLLETS AND FEED FINGERS FOR BROWN & SHARPE MACHINES

IMMEDIATE DELIVERY FROM STOCK

The addition to the *Precision* line of collets and feed fingers designed for use in Brown & Sharpe machines gives you a dependable source for speedy delivery . . . And as always, the *Precision* name on these new collets and fingers is your unconditional guarantee of selected steels, uniformity in machining, grinding and heat treating. You will like their lasting spring quality and hair-trigger accuracy.

DO YOU KNOW THESE OTHER Precision PRODUCTS . . .

Precision lathe collets fit many machines and attachments including 10" Atlas, Logan, Craftsman, Powr-Kraft, South Bend, Clausing, Sheldon, Hardinge, Elgin, Dalton, Schauer, Sebastian, etc.


4C
3AT, 3C, 1A collets, drawbars, adapters
5C
480 (AC-50)
KLUTCH-KOLLET
for chucking work to 2⅛ dia. Fits 3AT, 3C, 1A, 5C standard adapters. Head soft.
SPEEDICHUK & BREN Collet
Increase ½" collet cap. lathes to ¾". For Atlas, Logan, South Bend, Clausing, etc.

KASSON GENERAL DIE AND STAMPING COMPANY
PRECISION COLLET DIV., 248 Matt Street, New York 12

It pays to specify *Precision* when collet work is indicated, because you get the best, and you get it promptly from stock. Order from your Industrial Supply Distributor. . . He is ready to serve you. *Literature is available. Why not write for it today.*

SINE BAR APPLICATIONS

So many mechanics have become accustomed to depending on a sine bar for angular measurement, and sine bars are used so frequently with gauge blocks, that it is not at all surprising to find manufacturers of gauge blocks providing sine bars also. However, there are various sine bar layouts with which gauge blocks are not used. There are sine angle plates, for instance, so arranged that they will measure exact angles in any part of the quadrant, and with which the only auxiliary device needed is a two-inch micrometer.

On the other hand, some sine angle plates require the use of gauge blocks. These plates have a ground, hardened and lapped cylinder, located under the upper plate, to provide a measuring surface for contact with the gauge blocks used. It is claimed that by using precision gauge blocks with this sine angle plate, the top plate can be set to any angle, within an accuracy of 0.0001" in a length of 3".

The plain sine bar, as made by some manufacturers of highly accurate gauges and measuring devices, is simply an accurate straight-edge, into which are set two hardened and ground plugs, the plugs being exactly alike in diameter. They are so applied that their line of centers is exactly parallel with the edges of the straight-edge. The plugs set exactly 5" apart on centers, or exactly 10" apart, as near as possible, to make for easy calculation.

Greater accuracy is obtained in using a 10-inch sine bar than in using the five-inch, tho either gives close accuracy. The 10-inch bar is to be preferred in all cases where its larger size is not inconvenient. Plain sine bars are used in connection with an accurate surface plate, either for measuring angles accurately or for locating work to a given angle, within close limits.

A device that has proven highly popular is a sine block. It is made of alloy steel, hardened and ground all over.

STOP

DRILL, TAP, AND REAMER BREAKAGE with BUFFALO

TORQUE CONTROL COUPLINGS

Based on the fact that torque and inertia are the fundamental principles of all drilling, reaming and tapping operations, the BUFFALO TORQUE CONTROL COUPLINGS are designed to eliminate drill, tap and reamer breakage by acting as a safeguard between the driving power and the tool.

When adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when over-loaded, thereby severing the driving power thru the coupling itself, but automatically re-engage and re-assume the driving power when the overload has been removed.

Available in production and utility models, in sizes for all operations on drilling machines, lathes, turret lathes, horizontal boring mills, etc.

Also manufactured as STUD DRIVERS, NUT SETTERS AND TRANSMISSION TYPES.

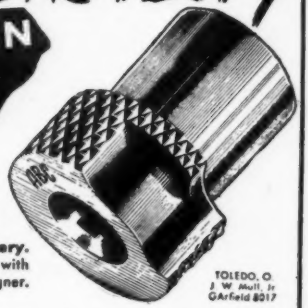
Machine Tool Type
Utility Model

Write for complete descriptive Bulletin No. 1007 today!

BUFFALO MACHINERY CO., INC.
838 Grant Street **Buffalo 13, New York**

INTERCHANGEABILITY

Your KEY to
MASS PRODUCTION
Will Speed up Drilling
and Lower Costs



A. S. A. STANDARD
PRECISION DRILL JIG BUSHINGS

Standard sizes and styles in stock for prompt delivery.
Write for catalog showing table of standard sizes of bushings with price list and other valuable information for the tool designer.

TOLEDO, O.
J. W. Mull, Jr
GArfield 8017

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BUFFALO, N. Y
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Cleveland 8196

CLEVELAND, O
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HEnderson 6113

• DETROIT, MICH
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TEmple 1-4040

INDIANAPOLIS, IND
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Riley 9393

LOS ANGELES, CALIF.
Walter W. Miller
PRospect 2687

NEW YORK, N. Y
Carlton Eberhard
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DElaware 3553

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H. F. Soderling Co.
GArfield 8386

• STRATFORD, CONN
Ellsworth St. & Son Co
BRidgeport 7-3317

•Stock carried at these locations

ACCURATE BUSHING COMPANY, 440 North Ave.,•GARWOOD, N. J. WEstfield 2-2415

McGILL SPECIAL BEARINGS
WITH Bronze Retainers
Precision-built, with precision tolerances, to meet modern industrial needs. Engineers appreciate their trouble-free performance, extra load capacity and long life. McGILL Bearings are made in a wide range of types and sizes. SPECIAL BEARINGS can be made to fit almost any requirement. Write our Engineering Department regarding your specific bearing needs.
McGILL MANUFACTURING CO., INC., VALPARAISO, INDIANA
MANUFACTURERS OF BALL AND ROLLER BEARINGS

STORAGE BATTERIES

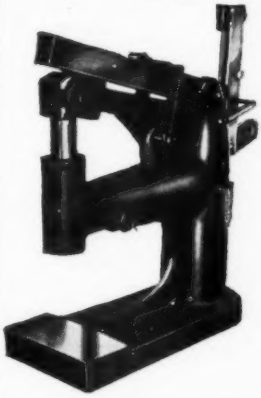
The most important single use for storage batteries around the average metal-working establishment is for powering the electric truck, in its various designs. There are other methods of providing power for trucks, it is true, but the use of good storage batteries allows a truck to be operated indoors without making any noise, without producing any vibration and without giving out any fumes. This has made storage batteries so popular for this purpose that they are supplied from a considerable number of sources.

Those who use batteries in any appreciable quantity are naturally interested in knowing how much service a given battery will provide between chargings, as well as facts concerning the length of its productive life. It may be said in general, that various manufacturers of such batteries have improved their product on both counts, as against those in use some years ago. A sure way to find out which batteries give the best and the longest service is to keep an actual service record on different ones used and check one against the other.

There are various other industrial uses for storage batteries. Portable lighting outfits are occasionally needed. Emergency power and light systems for various industrial services are often taken care of in this way. Call bells, annunciators, signal systems, telephones and time clocks, are all commonly served by storage batteries. On all of these, the points cited are of importance, as well as the comparatively light weight of a battery and the rapidity with which it will charge.

With particular reference to charging storage batteries, it is common practice to use a rectifier, to produce a d-c current for the charging period. Rectifiers for battery charging and other industrial services are available from various sources. It is necessary to use care to prevent overcharging. Therefore, careful control of time during which d-c voltage is applied to battery is important.

AUTOMATIC STAKING MACHINE INCREASES PRODUCTION With Unskilled Manpower!



Outperforms conventional Riveters on numerous jobs.

A shortage of skilled workers won't upset your staking machine production if you use the Automatic Staking Machine which, even in unskilled hands, is fast, accurate and thoroughly dependable.

Uniform blow of hammer makes it ideal for riveting movable joints; can be quickly and easily adjusted for various jobs.

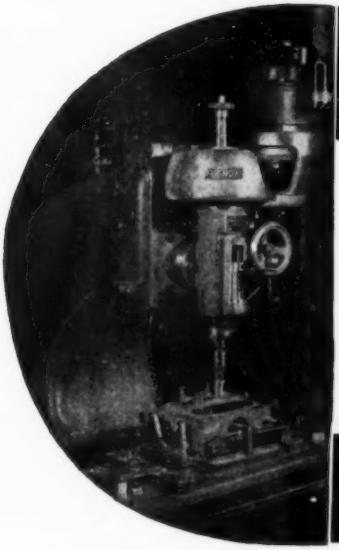
Available in Three Sizes

	1	1-B	2
Stroke	2"	2"	2½"
Spindle	1"	1"	1¼"
Throat Depth	4¾"	4¾"	8½"

Now's the Time to Write for Descriptive Material and Prices.

WEBER MACHINE CORP.

59 Rutter Street Rochester 6, New York



MILLING - DRILLING - BORING ATTACHMENT for Heavy Duty Operations

Photo shows Rusnok head used to convert an old type milling machine into high speed, versatile, productive equipment. Uses many types of cutters on a wide range of work. Easily mounted — tilts to any angle. Large size spindle (No. 9 B & S taper). Takes 1/16" to ¾" end mills. Large quill with 4" travel, counter balanced, hardened and ground. Six speeds 250 to 3000 RPM. Lever and worm feeds. ½ h.p. motor. Specially engineered by RUSNOK to meet modern demands for high speed, high precision, heavy duty end mill operations.

Prompt delivery.

Write for illustrated Circular and Prices

RUSNOK TOOL WORKS

4840 WEST NORTH AVE. CHICAGO 39, ILL.

Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

Send for Bulletin

American
DIAMOND TOOL & GAUGE CO.
15920 WOODINGHAM • DETROIT 21, MICH.

RAILROADS TEST GAS TURBINES

Railroad locomotive fuel costs may be cut to one-third or one-fourth of their present level by use of a coal-burning gas turbine now in an advanced stage of successful experimental development, according to J. I. Yellott, director of research of the Locomotive Development Committee, sponsored by a railroad group in cooperation with Bituminous Coal Research, Inc., and Bituminous Coal Institute. The experiments have been carried on at Johns Hopkins University, Baltimore, Md.; Battelle Memorial Institute, Columbus, O., and the Institute of Gas Technology, Chicago.

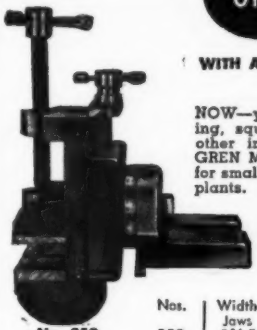
The problem of adapting the gas turbine to the burning of a solid fuel was broken down into three major parts, and a number of solutions have been proposed to each. Coal handling and preparation are relatively simple, because the high thermal efficiency of the gas turbine will reduce the coal requirements of a typical locomotive to about 25 per cent of the consumption of the standard steam locomotive. Pulverization of the coal has been accomplished by the coal atomizer, a newly developed invention by which coal is pulverized to the consistency of talcum powder by the simple process of causing it to pass with compressed air thru a nozzle, thus 'puffing' the coal and causing it to fly into a very fine powder.

The burning of the coal under pressure is accomplished with the aid of simple equipment, resembling in principle the aircraft jet propulsion combustors. The removal of the fly ash in the form of a dry powder is achieved by the use of a battery of small mechanical cyclone separators. Mr. Yellott stated that the maintenance cost should be considerably lower than that of the steam or diesel locomotive, and predicted that the gas turbine would become as important on the railroads as in the air.

MILL IT ON YOUR LATHE

WITH A **PALMGREN**

MILLING ATTACHMENT



NOW—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has 360° graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

IMMEDIATE DELIVERY

Nos.	Width Jaws	Depth Jaws	Jaws Open	Weight Pounds	Base Opening	Price F.O.B. Factory
150	1½"	1"	1⅛"	6½	1"	$18.75
250	2½"	1⅞"	2½"	11	1¼"	24.75
400	4"	1½"	4"	25	2"	39.75

No. 250

Order from your dealer or jobber. Write for circular No. 350.

CHICAGO TOOL AND ENGINEERING CO.

Mfrs. of PALMGREN PRODUCTS for over 28 Years

8384 South Chicago Avenue • Chicago 17, Illinois

BUILDERS 'T' SURFACE GRINDER

THIS LITTLE GRINDER MAKES BIG MONEY

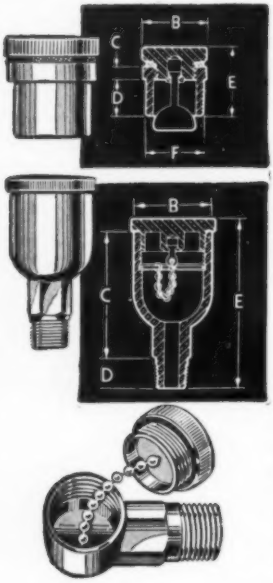
Don't monkey around with short run jobs on big expensive machines — Builders 'T' Grinder saves set up time and frees your large machines for long production runs. Highly accurate, simple to operate . . . handles work up to 8" long, 4" wide and 10" high.

Prompt delivery. Send for Bulletin 644.

BUILDERS IRON FOUNDRY
21 Codding St.
Providence 1, R. I.

SCREW TOP OILERS

for Vapor-Tight Protection



- **Covers Anchored—can't drop or lose.**
- **Tops gasketed for vapor-tight closure.**
- **Threads are die cut for snug fit.**
- **Knurled tops for convenient removal.**

Styles "RS", "AS", "ASA" and "STG" Oilers, although standard stock items, are somewhat of a specialty. They are particularly adapted for revolving, mixing or agitating equipment —in food processing and similar applications requiring rigid sanitation—also for chemical and other industries having harmful vapors or excessive dust conditions. Available in a range of capacities. Ask for catalog No. 60 presenting complete line of lubricating devices.

GITS BROS. MFG. CO.

1860 South Kilbourn Avenue, Chicago 23, Illinois

Exclusive for over 35 years

BEARINGS

The nation's motor and machine manufacturers recently were urged to join a movement to standardize sizes of ball and roller bearings just as sizes of electric bulbs, tires, clothing and shoes are standardized. This standardization, asserted S. F. Wollmar, executive vice-president of SKF Industries, Inc., would reduce overall costs, speed delivery of bearings to prime reconversion centers, aid young industries, and broaden American participation in world reconstruction.

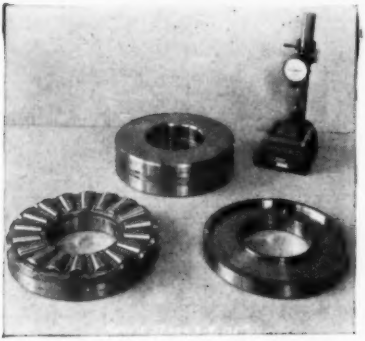
Ball and roller bearing manufacturers are now required to produce and stock as many as 40,000 sizes and makes of anti-friction bearings, Mr. Wollmar said. Some of these products differ from others by the merest hair's breadth. If a uniform system of basic sizes were adopted, it might be possible to concentrate our capacity on turning out about 2,000 sizes of bearings. These would meet almost every industrial need without sacrifice of quality.

Standards adopted as long ago as 25 years have been allowed to lapse because of the recent spectacular expansion of the machinery industry. However, the war emphasized the rapidity with which standardized bearings could be produced, as well as the production difficulties that constantly plagued the output of nonstandard bearings.

Early standardization would be of particular benefit to such new industries as television and synthetic fabrics, according to Mr. Wollmar. Studies made by SKF engineers indicate that bearing standardization would result in speedier and more economical production and customer servicing for those industries.

Future foreign business of American manufacturers also would be helped by standardization. Potential customers in foreign nations would be much more likely to buy American equipment if they knew they could obtain standard-sized bearings and other parts with relative ease.

KAYDON THRUST BEARINGS



The Kaydon Engineering Corp., Muskegon, Mich, announces a conical roller thrust design to supplement the straight roller type of thrust bearings. Conical bearings are used extensively in oil field swivels where the bearing must carry the entire weight of drill pipe on wells with depths over 15,000 ft. This same type of bearing is used in many applications in steel mill equipment, paper mill machinery and other heavy duty equipment.

This bearing design is such that the apex of the cone formed by the rollers meets at the true center of the bearings. This permits the rollers to align themselves between the tapered faces and the outside rib of the raceways. The one-piece Kaydon bronze cage acts only as a separator.

Higher speeds, which are constantly demanded in many types of equipment, are easily handled by this type of bearing. Conical roller thrust bearings are, of course, designed to carry thrust loads only.

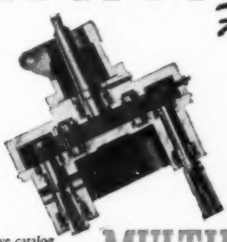
A complete series of standard sizes of conical roller thrust bearings from 9-7/8" O.D. up to 19½" O.D. and load capacity up to 444,000 lbs is now being made.

MECHANICAL MASTODON — Almost three times the amount of water used in a day by a city the size of Philadelphia—219 million gallons—is pumped daily thru the steam condenser tubes of the Philadelphia Electric Co.'s Richmond power station to cool steam back to water. The mammoth condenser, built by Westinghouse, is 44 feet long, 29 feet wide and 32 feet high—the size of a seven-room house.

THRIFTMASTER

Full Ball Bearing Construction

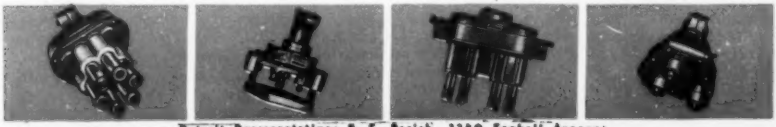
for Longer Life
Higher Production
Higher Profits



Descriptive catalog on request.

Thriftmaster Drillheads are *job engineered!* For recommendations and quotation (without obligation) write our engineering department.

MULTIPLE SPINDLE DRILLHEADS



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SINCE 1901

Moline Tool Company since 1901 has been designing and building machine tools of the highest degree of efficiency for these operations:

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"Hole Hog" machine tools are versatile—their construction makes possible easy change-over to other jobs. They are easy to operate and are ruggedly built for years of continuous production service. For man-hour savings—for more efficient, smoother work—look to Moline machines.

Write for information concerning machine tool equipment for your special problems.

MOLINE TOOL CO.
HOLE-HOG
MOLINE, ILLINOIS

MOLINE TOOL COMPANY
108 20th Street MOLINE, ILLINOIS

"MOST BRILLIANT" LAMP

What is said to be the most brilliant lamp ever developed for general commercial use, a 1,000-watt tubular bulb whose powerful yellow-green light streams from a mercury vapor arc the diameter of a cigaret, was announced recently by the Westinghouse Lamp Division, Bloomfield, N. J. The air-cooled lamp produces 60 lumens for each watt of electricity consumed.

"Sixty thousand lumens, the lamp's total light output, is equivalent to the light cast by a canopy of 125 incandescent bulbs of 40-watt size, or three times the light output of a conventional 1,000-watt incandescent bulb," said Daniel S. Gustin, Westinghouse lamp engineering manager who designed the lamp.

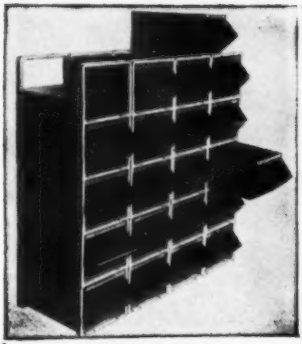
It has an arc stream, about twice as long as a cigaret, enclosed in a quartz tube which, in turn is enclosed by a hard glass exterior tube. Overall, the lamp measures 14 inches.

The lamp was designed primarily for the lighting of high ceiling factories, baseball diamonds, indoor sports arenas and other expansive areas where a high level of lighting with a minimum of reflectors is desirable.

The efficiency attained by the new lamp, its designer said, was made possible by boosting the mercury vapor pressure inside the tube four times beyond pressure levels used previously.

Equipped with a mogul-screw base, the new bulb can be burned in any position. Like all arc lamps, the new lamp operates with a transformer, which steps up the voltage, and a simple current limiting device called a reactor.

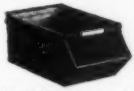
The lamp's efficiency, measured on the basis of amount of light produced for watts of electricity consumed, is 50 per cent better than the three sizes of air-cooled vapor lamps for general lighting available previously.



STACKBINS IN STACKRACKS

REDUCE HANDLING

of Tools, Parts and Materials



STACKBINS are individual hopper-fronted stacking bins, designed for storage, transportation and assembly of tools, parts and materials.

STACKRACKS are individual units which lock together to form racks of any size, shape or capacity. Stackbins slide like drawers in Stackracks.

Because Stackbins are portable containers – not fixtures – tools, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed – without disturbing any other bin.

Manufactured and sold in Canada exclusively by Walter H. Wickware, Ottawa

Write Stackbin Corp., 1085 Main St., Pawtucket, R. I.

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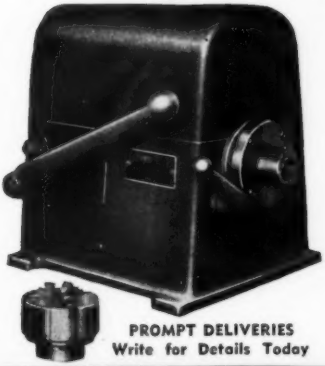
"Stacked and Still Accessible"

The COLBORNE SPEED LATHES



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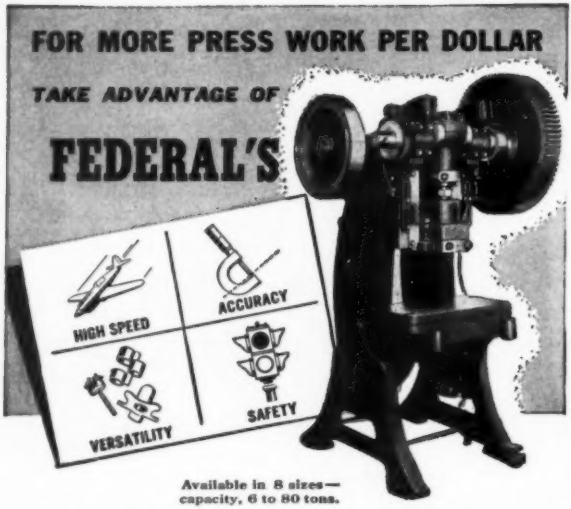

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"STANDARDIZED" STEAM TURBINE

The first "standardized" steam turbine built for electric power generation is in production at the South Philadelphia plant of the Westinghouse Electric Corp., L. E. Osborne, Vice-president, revealed recently. The unit is the result of a long-felt need to remove the "custom-made" label from such machines and introduce certain standard sizes and operating conditions. The project is a 30,000 kilowatt machine for the Riverview plant of the Southwest Public Service Co., at Borger, Tex.

This recent development, brought about by a committee organized by the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, is a step toward improving the power facilities of the country and at the same time giving more satisfactory service to the public in general," Mr. Osborne said.

The six sizes of turbines decided upon by the committee as within the range of the most common of the larger power plant sizes and therefore the most suitable for standardization, run from 11,500 to 60,000 kilowatts in productive capacity. This is sufficient range to provide power for cities from 10,000 to 50,000 population.

"With a plant's productive facilities geared to a definite number of turbine sizes, many types of stock parts, such as blades, can be turned out in quantity for use in future orders or to be kept in reserve as replacements," Mr. Osborne continued.

It is expected that eventually this new development will speed up production and facilitate quicker delivery of equipment to customers than when they had to wait for a tailor-made turbine.

Mr. Osborne emphasized that the standardization program will in no way hinder production of any size of steam turbine-generator needed for purposes for which the standard specifications might not be suited. The preferred standards are subject to amendment from time to time, so they can be continually improved.

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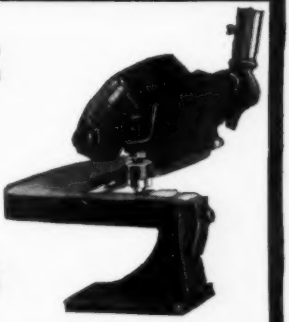

The No. B-3 BEVERLY Bench Type Shear with Ball Bearing Hold Down handles 3/16" or No. 10 gauge stainless steel. This sturdy shear weighs 58 lbs. and is equipped with H. C. H. C. Blades for heavy duty service.

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With a low-priced Bear Dy-Namic Balancer, the job is done to meet any standard requirements, in routine production, in a matter of seconds, and any shop hand learns to operate a Bear Balancer in a few hours! Bear machines are available for balancing bodies from a few ounces to two tons. Write for the Bear Catalog! Bear Mfg. Co., Dept. MTBB, Rock Island, Illinois

BEAR

COMBINATION

STATIC AND DY-NAMIC BALANCING MACHINES

ALLIS-CHALMERS CONTROL

Accurate d-c positioning and indicating equipment that can be operated from an a-c or d-c line is announced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., for general industrial use wherever remote indication and control systems are employed. The equipment consists of a transmitter and a receiver.

Immediate receiver response without hunting or overshooting is said to be attained over the entire operating range of the system. The receiver is a positioning unit in which the relative strength of the magnetic fields of the stator determines the position that its permanent magnet rotor will assume. Any change in this relationship of the field strength causes the rotor to turn and assume the position corresponding to the new resultant of the two fields. The receiver torque is a function of the displacement between the rotor and the magnetic axis of the receiver.

The transmitter, which is essentially a variable resistance bridge, operated manually or automatically, controls the relative strength of the receiver magnetic fields.

Receiver and transmitter torques are independent, and the receiver torque required to move a device has no effect on the transmitter. The transmitter is designed to operate any number of receivers within rated capacity at any specified direct current voltage.

In this direct current system power requirements are essentially constant under all operating conditions. Overloading the receiver beyond its torque rating cannot damage receiver or transmitter.

Mechanically simple in construction, only four leads are needed for each receiver and two power supply leads to the transmitter on most applications. The equipment can be modified to operate at any desired d-c voltage.

Six sizes now available range from five ounce inches to 360 pound inches approximate pullout torque, and with a small drip-type rectifier unit may be operated on alternating current.

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ANGLE & RADIUS DRESSER

A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/3 ct. diamonds and instrument case included — $150.00 complete.

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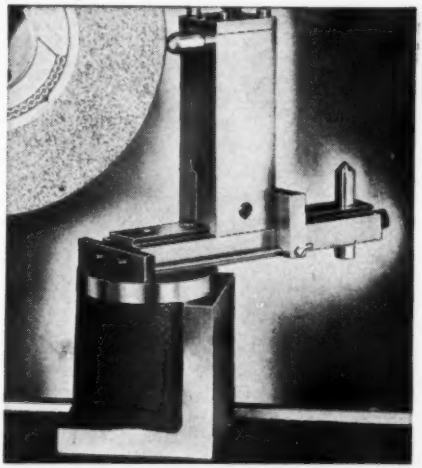

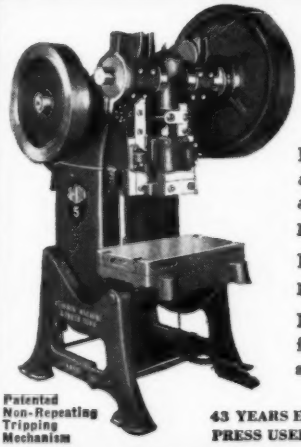

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PLEASE PRINT

SOLENOID VALVES

A solenoid is a combined coil and plunger, arranged in such manner that when the coil is energized electrically, the plunger is given an endwise movement. A solenoid valve is one which is actuated by such a device. Many are acquainted with such valves, but not all realize how extensive is the application of such valves. Consider that one manufacturer provides over 200 different types and sizes of solenoid valves, ranging in size all the way from ⅛" to 8", taking care of operating pressures from 1 lb to 3,000 lbs, with temperatures ranging up to 1,000°F. Solenoid valves are adapted for either remote or automatic control and, as a result, are used in many applications for which other valves are unsuitable.

Sometimes it is forgotten that fluid control is today largely connected with machine operation, especially in the field of hydraulics. In fact, there are some outstanding manufacturers of hydraulic equipment that specialize in providing solenoid valves for hydraulically - operated machinery. Providing means for remote or automatic control of hydraulic operating cycles, these valves are compact, easily installed, available in standard pipe sizes from ¼" to 3" and for pressures ranging up to 2,000 lbs per square inch. Applications include road machinery, hydraulic rotary power transmissions, hydraulic presses and various kinds of machine tools, in addition to different kinds of special hydraulic layouts.

When one considers application of modern electric timers, used in conjunction with and for the operation of solenoid valves, for hydraulic machine actuation, one can envision automatic machines with almost human intelligence. Consider what can be done with two solenoid valves, controlling two separate hydraulic circuits, for instance, in a given machine, and a duplex cycle timer that will automatically alternate the operation of those valves, at a predetermined time-interval.

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Fluid-Motion for Modern form-dressing

ONE SETTING
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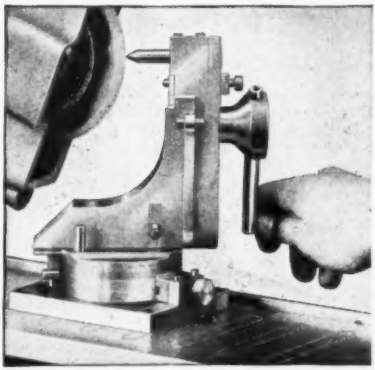
J & S Radii & Angle Dressers in the "Fluid-Motion" series are among the finest precision dressing instruments procurable . . . regardless of cost. There is a standard model to fit most form-dressing requirements.



Features

Fluid-motion dressing
.0001" accuracy
Automatic centering
7" & 14" wheel capacities
Large range yet compact
Chatterless and dustproof

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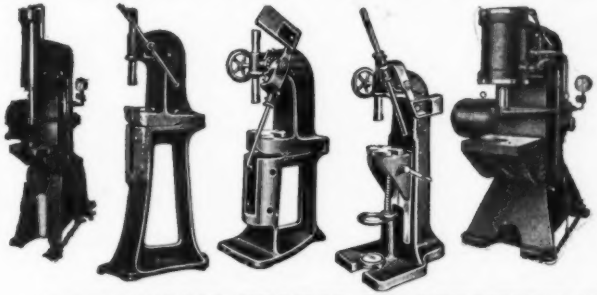
For ASSEMBLY, BROACHING, and BENDING



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Price $.90 Each In Any Size

New Low Prices — Increase Production — Cut Operating Costs

Tools are tipped with Tungsten Carbide and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left — 100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Right — 200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below — 300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits

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2	3/8	5/8	3.02
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2½	3/8	7/8	3.78
2½	7/16	7/8	4.15
2½	½	7/8	4.15
3	3/16	1	4.10
3	¼	1	4.10
3	5/16	1	4.35
3	3/8	1	4.54
3	7/16	1	4.79
3	½	1	5.04
4	3/16	1	5.67
4	¼	1	5.67
4	5/16	1	6.36
4	3/8	1	6.36
4	7/16	1	7.12
4	½	1	7.12
4	9/16	1	7.75
4	5/8	1	7.75
4	¾	1	8.38
4	7/8	1	10.00
5	3/16	1	10.00
5	¼	1	10.00

Diameter Inches	Face Inches	Hole Inches	Our Net Price Each
5	5/16	1	$10.00
5	3/8	1	10.00
5	7/16	1	10.00
5	½	1	9.51
5	5/8	1	10.52
5	¾	1	11.46
5	7/8	1	13.42
5	1	1	13.42
6	9/16	1	12.50
6	¼	1	12.50
6	5/16	1	12.50
6	3/8	1	12.50
6	7/16	1	12.50
6	½	1	12.41
6	5/8	1	13.92
6	¾	1 or 1¼	15.12
6	7/8	1 or 1¼	17.89
6	1	1 or 1¼	17.89
7	½	1 or 1¼	18.00
7	5/8	1 or 1¼	18.00
7	¾	1 or 1¼	21.67
7	1	1 or 1¼	25.39
8	½	1 or 1¼	25.00
8	5/8	1 or 1¼	25.00
8	¾	1 or 1¼	28.00
8	1	1 or 1¼	33.64

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TWIST DRILLS

Extra Length

9″ Cutting Flute — 12″ Long Drills

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9/64	12	9	1.50
5/32	12	9	1.50
11/64	12	9	1.50
3/16	12	9	1.50
13/64	12	9	1.60
7/32	12	9	1.60
15/64	12	9	1.75
1/4	12	9	1.75
17/64	12	9	1.85
9/32	12	9	1.85
19/64	12	9	2.00
5/16	12	9	2.00
21/64	12	9	2.25
11/32	12	9	2.25
23/64	12	9	2.50
3/8	12	9	2.50
25/64	12	9	2.75
13/32	12	9	2.75
27/64	12	9	3.00
7/16	12	9	3.00
29/64	12	9	3.25
15/32	12	9	3.25
31/64	12	9	3.25
1/2	12	9	3.25

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Low-cost Procunier Tapping Machines are the only machines with our compensating Springs for the automatic adjustment of tap driving pressure. Pre-Set independent of the operator, two long spiral springs exert the desired pressure on the tap, regardless of pressure on the foot pedal. Tap breakage is all but eliminated, tapping is speeded up and consistent accuracy is maintained. An automatic lubricating mechanism delivers the proper amount of lubricant to the tap at the precise moment, washing all the chips away.

Other features include the Procunier Hi-Speed Tapping Head with many exclusive advantages — and the Tru-Grip Tap Holder. Send coupon today for circular with full details, specifications and prices.

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We're looking forward to meeting you at booth #127 at the Tool Show in Cleveland, April 8th through 12th. Meanwhile, get acquainted with our products, Circle R Metal Cutting Tools. Ask for Catalog L.

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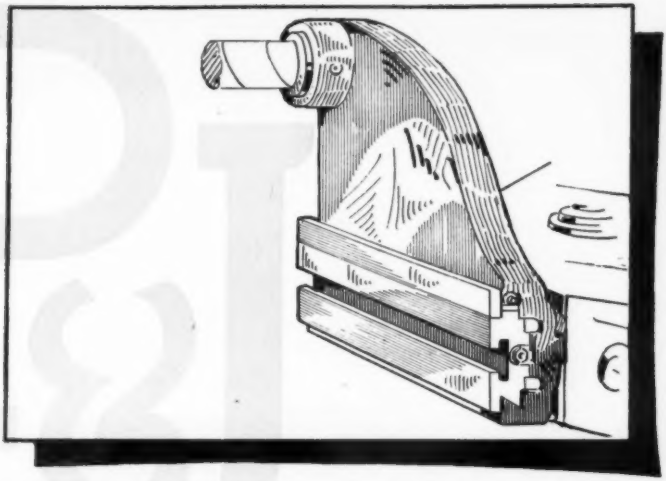

SLIDE TOOL . . . with Overhead Pilot

This versatile, horizontal Slide Tool is designed for use with a considerable number of Potter & Johnston Machines.

For heavy facing cuts, several cutter blocks may be held in the Slide, which is fed either to the rear or to the front of the machine by a pusher attached to the Machine Cross Slide. This sturdy fixture is of ample proportions and its rigidity is multiplied by the Pilot bar, allowing accurate and rapid stock removal from the work pieces. It is made with T-Slot on Center and Off Center.

This versatile tool is but one of many speedy, efficient production tools comprising the Potter & Johnston line. It will pay you to investigate these profit producing tools.

Post-war competition will demand modern tooling in the battle to reduce production costs. This helpful catalog will give you many constructive suggestions for increasing production and cutting costs. If you use Potter & Johnston machines, it will pay you to write for a copy—no obligation.

The POTTER & JOHNSTON MACHINE CO. PAWTUCKET, RHODE ISLAND

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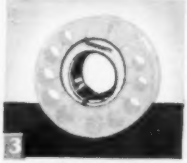
ROMAN MECHANICS LEARNED THEIR TRADE FROM GREEK TECHNICIANS KNOWN AS 'TECHNITAI', WHO STRANGELY ENOUGH WERE GROUPED WITH ARCHITECTS.
AS EARLY AS THE 1500'S JACKS SURPRISINGLY MODERN-LIKE IN APPEARANCE WERE USED TO RAISE HEAVY WEIGHTS.
STRANGELY ENOUGH
EARLY 19TH CENTURY EUROPEAN WORKMEN SCOFFED AT THE TWIST DRILL INVENTED ABOUT 1800 BY A CONNECTICUT MACHINIST.

Holy Smokes! They've done it again!

Blow all the whistles! They've done it again!

Blast out a fanfare for a great new Woodworth invention!

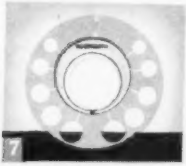


It's the WOODWORTH ADJUSTABLE THREAD Ring Gage.

Thread ring gages check the outside dimensions of threaded parts.

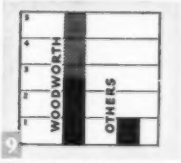
Adjusting 'em as they wear down saves time and money.

But old types get pear-shaped—lose accuracy—wear out fast.

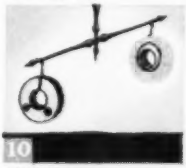


Woodworth's New Thread Ring Gage adjusts perfectly—STAYS ROUND.

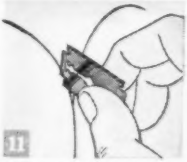
Never gets out of alignment when dropped or thrown about.



Wears 2 1/2 to 5 times longer—With equal distribution of wear.



Light Weight reduces operator fatigue—increases sensitivity.



It's amazingly accurate... ideal for hair-splitting work.

Woodworth's New Thread Ring Gage is an all-time champion!

Another Woodworth Contribution to Production

THE NEW Adjustable Thread Ring Gage, another revolutionary Woodworth instrument of accuracy, is now available to industry!

Employing an entirely new principle of design, and proven mathematically correct by actual tests, this gage assures roundness through the maximum range of adjustment.

Check these Five Important Advantages

1. *Greater Accuracy and Stability.* Stays round with adjustment. Threads held in alignment of thread helix angle with adjustment. Will not reject parts that should pass inspection.

2. *Longer Wear Life.* Equal distribution of wear over the full thread circumference, through the entire range of adjustment, increases wear life 2½ to 5 times.

3. *Less Weight.* Aluminum alloy outer body halves the weight to greatly reduce operator fatigue and increase sensitivity.

4. *Positive Identification.* Green outer body for GO GAGE and red for NOT GO GAGE saves time for operator.

5. *Positive Adjustment.* Cannot be thrown out of adjustment by ordinary blows or falls that change setting of conventional gages.

You can speed up production and decrease gaging costs on your thread inspection operations with this amazing instrument! Write for completely illustrated folder 46-R.

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Abrasive Cloth, Paper, Discs, Belts, Wheels, Stones, etc., 46, 118, 119, 171, 260B, C-
Aftercoolers, 337
Air-Operated Equipment. (Look for specific item)
Alloys, Low Temperature, 303
Angles, 56, 70
Arbors, 83, 186, 239, 308

Balancing Machines, 145, 382
Balancing Ways, 13
Bearings, Ball, 268, 372
Bearings, Roller, 372
Belt Fasteners, 212, 214
Bending Equipment, 41, 267, 299, 313, 314, 385
Blades, Band Saw, 21, 105, 157
Blades, Hack Saw, Inside Front Cover, 157
Boring Bars, 169, 180, 245, 346
Boring, Drilling and Milling Machines, 22, 129, 151, 163, 328, 373, 378
Boring, Drilling and Tapping Machines, 309
Boring Heads, 66, 180
Boxes and Bins, Shop, 246, 379
Brakes, Press and Bending, 41
Broaches, 57, 169, 249, 331
Burring Machines, 232
Bushings, Drill Jig, 275, 281, 371

Calipers, 131, 160, 336
Carbide Tool Grinders, 338, 355
Carbides and Special Cutting Tools, 11, 30, 144, 169, 291, 297, 311, 355, 386
Centers, Bench, 47, 90
Centers, Lathe, 88, 199, 247, 262, 280
Chains and Sprockets, Back Cover
Chasers, Thread, 191
Chisels, 86
Chucks, Air-Operated, 107
Chucks, Collet, 82, 87, 334
Chucks, Drill, 256, 305
Chucks, Lathe, 100, 193, 305, 370, 393
Chucks, Magnetic, 317
Clamps, 86, 241, 251, 279, 302
Clutches, 20, 24, 132, 167, 363
Coating Equipment, 290
Collets, 71, 87, 370
Comparators, 12, 90, 315
Controlling Devices, 26, 43, 70, 181, 197, 279, 341, 351
Coolant Systems, 34, 243
Counterbores, 30, 83, 161, 169, 233, 235, 239, 341
Countersinks, 239
Couplings, Flexible, 338, 371
Cut-Off Machines, 94, 113
Cut-Off Wheels, 194
Cutting Tools, 51
Cutters, Milling, 30, 85, 87, 102, 169, 182, 233, 239, 305, 311, 387, 390
Cutters, Rod, 294, 313
Cylinders, Hydraulic and Pneumatic, 96, 107

Deburring Tools, 305
Demagnetizers, 193, 197, 270, 285, 312
Diamond Powder, 128, 301

Diamond Wheels, 128, 237
Diamonds and Diamond Tools, 128, 237, 300, 334, 355
Die Heads, Threading, 23, 87, 184
Die Making Machines, 31, 127, 359
Dies, 93, 191, 305
Die Sets, 263, 271, 272, 293, 399
Die Set Pullers, 59
Dividing Heads, 55, 164, 193
Dowel Pins, 341
Dressing Fixtures, Grinding Wheel, 90, 146, 237, 295, 383, 385
Drill Heads, 18, 216, 272, 339, 377
Drilling Machines, Bench, 168, 288
Drilling Machines, Multiple Spindle, 38, 120, 121
Drilling Machines, Radial, 113, 120, 121
Drilling Machines, Vertical, 38, 120, 121, 335
Drills, Center, Core, Twist, Square, etc., 83, 388, 401
Drills, Portable Electric, 28, 109, 219, 404
Drives, Motor, 32, 64, 69, 196, 204, 260, 314, 317, 336, Back Cover
Duplicating Machines, 26, 175
Dust Control Equipment, 76, 84, 261, 317
Dyes, Layout, 188, 192, 324

End Mills, 85, 161, 169, 182, 233, 239
Engraving Machines, 175
Etchers, 175, 285, 312, 332

Facing Tools, 206, 235
Feed Fingers, 71, 370
Files, 49, 183, 187
Files, Rotary, 15, 49, 67, 95, 143, 165, 183, 187, 208
Filing Machines, 44, 232, 307, 312, 317, 359
Filters, Air, 40
Filters, Coolant, 243
Flexible Shaft Equipment, 15, 67, 113, 143, 155, 208
Form Tools, 30, 169, 182, 239, 297, 325, 355
Furnaces, Heat Treating, 78, 154, 207, 222, 257, 279, 283

Gage Blocks, 12, 255, 317
Gages, 233, 234, 275, 315
Gages, Bore, 173, 202
Gages, Thread, 66, 202, 223, 393
Gauges, 374
Gear Cutting Machines, 147, 213
Gears, and Gear Units, 304, 306, 335, 347
Grinders, Abrasive Belt, 162, 216, 296, 345
Grinders, Air, 45, 61, 79, 211, 297
Grinders, Backstand, 46
Grinders, Carbide Tool, 84, 326
Grinders, Chucking, 149
Grinders, Cylindrical, 139, 260B, C
Grinders, Disc, 185
Grinders, Drill, 31, 84, 244, 321
Grinders, External or Internal, 149, 159, 323
Grinders, Flute, 273
Grinders, Jig, 74
Grinders, Pedestal, 94, 204, 404
Grinders, Tool Post, 28, 404
Grinders, Portable Electric, 28, 61, 194, 195
Grinders, Snagging, 220, 318

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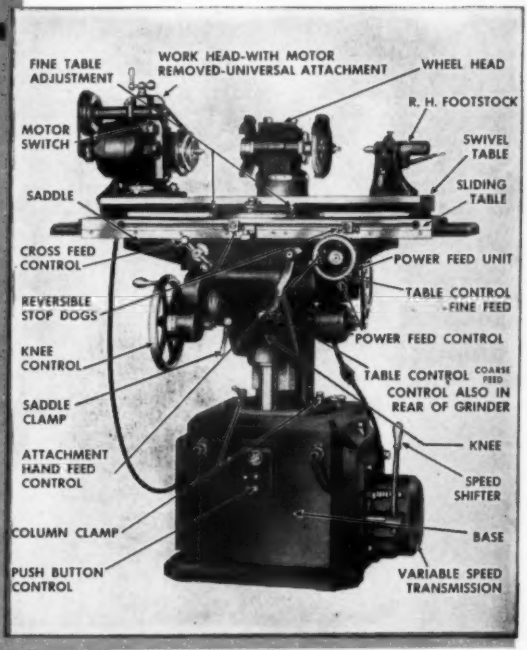

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Grinders, Tap, 84, 150, 259, 274
Grinders, Tool and Cutter, 31, 175, 395, Inside Back Cover
Grinders, Universal, 8, 9, 159
Grinding Wheels, 94, 185, 194, 195
Guards, Safety, 264, 343
Guide Line Lights, 108
Guides, Saw, 273
Guns, Air, 40, 158, 324

Hammers, 45, 258
Hinges, 248, 346
Hoists, 181
Holders, Die, 72
Holders, Tool, 84,, 201
Honing Machines, 229, 232
Hose Assemblies, 14
Hydraulic Equipment (Look for specific item)

Indexing Heads, 55, 359
Indicators, 131, 157, 244, 277
Inspection Devices, 47, 56, 90, 131, 157, 172, 178, 328, 329, 349

Jacks, 4
Jig Borers, 74, 127, 213, 327
Jigs and Fixtures, 4, 93, 101, 134, 251, 281, 329, 359, 391, 393
Joints, Universal, 285, 381

Keyway Cutting Machines, 150, 202, 249
Knurling Tools, 139, 322

Lapping Equipment, 90
Lathe Attachments, 53, 289, 310, 357, 391
Lathes, Automatic, 13, 97, 138, 145, 395
Lathes, Bench, 2, 3, 65, 166, 215, 222, 225, 287
Lathes, Engine and Toolroom, 65, 68, 117, 138, 166, 215, 274, 287, 395
Lathes, Hollow Spindle, 33
Lathes, Polishing, 48, 113, 379
Lathes, Production, 33, 68, 97, 138, 238, 274
Lathes, Turret, 2, 3, 13, 65, 115, 117, 137, 138, 145
Layout Materials, 188, 192, 244, 324,
Levers, 70
Lighting Equipment, 16, 17, 345
Locating Tools, 178, 328
Lubricants, 142, 315, 317
Lubricators, 341, 376

Magnifiers, 12, 231
Maintenance Materials, 198, 284
Mandrels, 83, 266, 308
Marking Machines, 152, 218, 262, 270, 343
Micrometers, 131, 277
Microscopes, Shop, 12
Millers, Thread, 58
Milling Machine Attachments, 375
Milling Machines, Horizontal, 133, 141, 166, 210, 253, 276, 319 ,328
Milling Machines, Vertical, 62, 127, 141, 163, 175, 253, 288, 327, 373
Mills, Hollow, 235, 344
Motors, 64, 106, 113, 204

Nibblers, 365
Numbering Machines, 152, 218, 262, 270, 343

Oil Germicides, 333
Optical Flats, 12, 349

Parallels, 12, 70
Pantograph Machines, 175
Plates, Surface, 56, 70, 177, 281, 345
Plating, Chromium, 275
Polishing Machines, 404
Positioners, 329
Presses, Arbor, 75, 357, 385
Presses, Drill, 113, 166
Presses, Hydraulic, 75, 260A, 385
Presses, Punch, 153, 296, 339, 380, 383
Pumps, Coolant and Lubricant, 34, 170
Pumps, Hydraulic, 260A
Punches, 86, 313
Punch Presses, Turret, 80
Pyrometers, 246

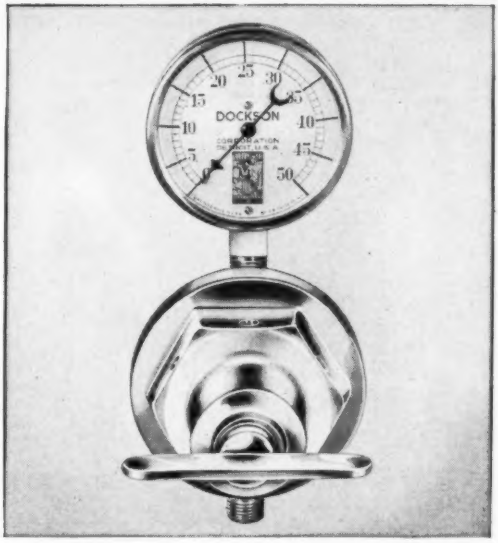
Reamers, 63, 83, 161, 169, 182, 233, 239, 245, 297, 363
Reaming Machines, 271
Rectifiers, 193, 197
Refrigerating Equipment, 99
Regulators, Air, 40, 341, 397
Retaining Rings, 89
Riveting Machines, 42, 96, 288, 294, 351, 373
Roll Forming Machines, 50

Sanding Equipment, 28, 176, 347
Saw Blades, Band, 317, 322
Saw Blades, Hack, 322
Saw Sharpeners, 322
Sawing Machines, Band, 44, 113, 153, 306, 312, 317
Sawing Machines, Circular, 28, 219
Sawing Machines, Hack, Inside Front Cover, 25, 193, 227, 242
Saws, Slitting, 390
Scrapers, 327
Screw Drivers, Power, 37, 79, 211, 295
Screw Machines, Automatic, 10, 23, 27, 35
Screw Machines, Hand, 2, 3, 138
Screws, Cap, Set, Socket and Machine, 179, 295, 330
Screws, Transfer, 240, 246
Separators, 337
Services: Milling, Grinding, Lapping, Rebuilding Repairing, Business, etc., 57, 93, 179, 228, 244, 264, 272, 282, 325, 331
Shapers, 29, 39, 147, 153, 166
Shearing Machines, 29, 221, 314, 365
Shears, Portable, 246, 267, 381
Shears, Squaring, 221
Shims, 313
Sine Bars, 161, 329
Spacing Collars, 302, 321
Speed Reducers, Back Cover
Spindles, 91
Spot Facers, 161, 169, 182
Sprayers, 337
Spring Winders, 276
Steel and Steel Stock, 122
Steels, 384
Stock Stands, 331, 332, 342
Stops, Lathe, 326
Strainers, 337, 341
Stud Setters, 87, 371
Surplus Tools, 250

Tables, Elevating, 162, 242, 333
Tables, Rotary and Index, 62, 266
Tapes, Measuring, 157
Tapping Attachments, 15, 135, 273, 351, 389
Tapping Machines, 38, 81, 156, 190, 200, 224, 269, 389
Taps, 19, 87, 189, 191, 252, 305
Tap Extractors, 130
Threading Machines, 58, 311
Tool Cribs, 268
Tools, Cutting Off, Front Cover, 85, 98
Tools, Recessing, 206
Tools, Turning, 53, 289, 357
Torches, Soldering, 254
Torque Wrenches, 203
Traps, 337
Turrets, Lathe, 112, 277, 299, 305

V-Blocks, 292
Vacuum Cleaners, 200
Valves, 43, 260A, 279
Vises, Bench and Machine, 52, 92, 139, 193, 216, 226, 230, 236, 248, 260, 260D, 292, 293, 316, 325, 329, 375
Vises, Power, 40, 230, 279

Welding Equipment and Supplies, 1, 54, 110, 111, 122, 320, 403
Wire Forming Machines, 349
Wiring Systems, 105
Wrenches, 136, 241



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Index to Advertisers

Abart Gear & Mch. Co.....306
Accurate Bushing Company.....371
Ace Abrasive Laboratories.....301
Acme Diamond Tool Company.....300
Acme Equipment Company.....221
Acme Industrial Company.....281-349
Acme Tool Company.....56
Acme Wire & Iron Works.....268
Acorn Bearing Company.....268
Acromark Co.....270
Acro Metal Stamping Co.....59
Aget-Detroit Company.....261
Aircraft Machinery Corp.....133
Airway Pump and Equip. Co.....158
Alco Tool Co.....72
Allison Tool & Eng. Co.....82
Almond Co., T. R.....256
Alofs Mfg. Co.....270
American Cutter & Engrg. Corp.....239
American Diamond Tool & Gauge Co.....374
American Gauge Co.....90
American Measuring Instruments Corp.....160
American Saw & Mfg. Co.....105
Anderson Bros. Mfg. Co.....327
Andersons, Inc.....182
Annis Co., R. B.....285
Armstrong-Blum Mfg. Co.....Inside Front Cover
Armstrong-Bray & Co.....214
Armstrong Bros. Tool Co.....4
Aro Equipment Corp.....79
Arter Grinding Machine Co.....36
Atlantic Gear Works.....335
Atlas Press Company.....166
Auto Moulding & Mfg. Co.....346
Avey Drilling Machine Co.....38

B-H Instrument Company.....184
Baldor Electric Co.....326
Baumbach Mfg. Co., E. A.....271
Bear Mfg. Company.....382
Behr-Manning Corp.....46
Benchmaster Mfg. Co.....253
Berkeley Equipment Co.....32
Beverly Shear Mfg. Co.....381
Blake Co., Edward.....84
Bland Precision Products Co.....179
Blauer Mfg. Co.....276
Blank & Buxton Machinery Co.....62
Boggis & Company, Henry P.....274
Boyar-Schultz Corp.....217
Bremil Mfg. Co.....246
Breuer Electric Mfg. Company.....200
Bridgeport Machines, Inc.....163
Bridgeport Safety Emery Wheel Co.....94
Brighthoy Div. (Weldon Roberts Rubber Co.)..171
Brown Corp., W. R.....40
Brown Engineering Co.....236
Brown & Sharpe Mfg. Co.....131
Bryant Chucking Grinder Co.....149
Buffalo Forge Co.....6
Buffalo Mchy. Co.....367-371
Builders Iron Foundry Co.....375
Burke Machine Tool Co.....276
Burr & Son, J. T.....202
Busch Co., J. C.....281

Canedy-Otto Mfg. Co.....120-121
Carboloy Company.....311
Carborundum Co.....118-119
Cardinal Machine Co.....230
Carpenter Steel Co.....384
Carroll & Jamieson Machine Tool Co.....274
Carter Products Co.....108
Center Scope Products.....178
Center Tool Company.....305
Central Mch. Works Co.....238
Cerro-de-Pasco Copper Corp.....303
Chandler Tool Co.....180
Chicago Gear Works.....304
Chicago Pneumatic Tool Co.....136
Chicago Rivet & Machine Co.....42
Chicago Screw Co.....205
Chicago Tool & Engineering Co.....375
Chicago Wheel & Mfg. Co.....194-195
Cincinnati Electrical Tool Co.....404
Cincinnati Grinders, Inc.....9
Cincinnati Milling Machines.....8
Cincinnati Shaper Co.....29
Cincinnati Tool Co.....86
Circular Tool Co.....390
City Machine Company.....146
Cleveland Automatic Machine Co.....10
Cleveland Twist Drill Co.....83
Clipper Belt Lacer Co.....212
Colborne Mfg. Co.....379
Columbus Die, Tool & Machine Co.....272
Colwell Co., S. G.....399
Comet Tool Co.....346
Commander Manufacturing Co.....272
Comtor Company.....315
Conant Tool & Eng. Co.....331
Cone Automatic Machine Co.....35
Continental Tool Works,
Div. of Ex-Cell-O Corp.....169
Conway Clutch Co.....24
Cooley Electric Mfg. Corp.....307
Cooper Co., D. C.....315
Cosa Corp.....213
Coulter Machine Co., James.....58
Criterion Machine Works.....60-338
Crobalt, Inc.....51
Cullen-Friedstedt Co.....320
Cullman Wheel Co.....Back Cover
Curtis Universal Joint Co.....265
Cushman Chuck Co.....100

Danly Machine Specialties.....399
Davis & Thompson Co.....328
Dayton Rogers Mfg. Co.....321
Dearborn, J. W.....359
Deepfreeze Div. (Motor Products Corp.).....99
Delloy Metal Corp.....144
Dempsey Industrial Furnace Corp.....279
Desmond-Stephan Mfg. Co.....295
Detroit Die Set Corp.....263
Detroit Power Screwdriver Co.....295
Detroit Stamping Co.....302
Detroit Tap and Tool Co.....259
DeVlieg Machine Co.....151
Diamond Mch. Tool Co. (Cal.).....319
Diehl Machine Works, G. M.....115
DoAll Company.....317
Dockson Corporation.....397
Dolge Co., C. B.....333
Douglas Machinery Co.....81
Dreis & Krump Mfg. Co.....141
Drive-All Mfg. Co.....196
Dykem Co.....324

Eastern Precision Gage Co.....202
Eastern Tool & Supply Co.....98
East Shore Machine Products Co.....249
Economy Mch. Products Co.....330
Economy Tool & Machine Co.....275
Eisler Engineering Co.....54
Electrolized Tap Corp.....189
Electro-Matic Products Co.....197
Elgin Tool Works.....225
Elmes Engineering Works.....260a
Empire Tool Co.....Front Cover
Enco Manufacturing Co.....112
Errington Mechanical Laboratory.....273
Ettco Tool Company.....135
Excelsior Tool & Machine Co.....299

Back of the Bride's Breakfast Table

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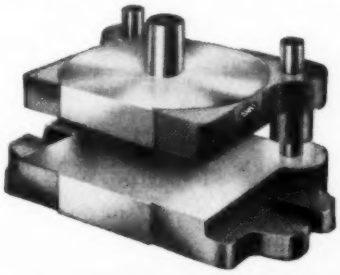

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Welded Steel Fabrication

Fakes & Co., Jos. B.....139
Falcon Tool Co.....233
Federal Foundry & Supply Co.....294
Federal Machine & Welder Co.....110-111
Federal Press Co.....380
Feedrail Corp.....104
Fellows Gear Shaper Co.....147
Fenn Mfg. Co.....92
Firth-Sterling Steel Co.....11
Flexrock Company 198-284
Ford Manufacturing Co., M. A.....95
Ford Motor Co. (Johansson Div.)....255
Fostoria Pressed Steel Corp.....16-17
Fulflo Specialties Co.....170

Gairing Tool Co.....341
Galland-Henning Mfg. Co.....181
Gallmeyer & Livingston Co.....Inside Back Cover
Gardner Machine Co.....185
Gear Grinding Machine Co.....167
General Die & Stamping Co.....370
General Eng. & Mfg. Co.....39
General Tool & Die Co.....291
Genesee Mfg. Co., Inc.....235
Geometric Tool Co.....191
Gerotor May Corp.....107
Gisholt Machine Co.....13-145
Gits Brothers Mfg. Co.....376
Glenzer Co., J. C.....201
Gorton Machine Co., Geo.....175
Govro-Nelson Company 18
Graham Mfg. Co.....316-322
Grant Mfg. & Machine Co.....294
Gray & Prior Machine Co.....381
Great Lakes Broach & Gage Co.....57
Greaves Machine Tool Co.....271-347
Greenerd Arbor Press Co.....385
Grenby Manufacturing Co.....159
Grinders & Fixtures, Inc.....55
Grob Brothers 317
Grobet File Co. of America.....49
Gruen Gauge Company.....224

H & H Research Co.....232
Hall Mfg. Co.....334
Hamilton Tool Co.....333
Hanson Clutch & Mchy. Co.....20
Hardinge Brothers, Inc.....3
Hart Machine Company.....329
Hartford Special Machinery Company.....52
Harvey Mfg. Corp.....359
Haskins Co., R. G.....67
Heimann Mfg. Co.....240
Herkimer Tool & Model Works.....329
Herman Stone Company.....177
Hevi-Duty Electric Co.....257
Hilliard Corp. 132
Hobart Brothers Co.....1
Hotel Gibson 337
Howe & Son, Inc.....322
Humm Safety Equipment Co., John.....331
Hydro-Borer Co. 309
Hypro Tool Co.....252

Ideal Com. Dresser Co.....45
Independent Pneumatic Tool Co.....37
Industrial Products Suppliers.....313
Ingersoll-Rand 34

J. & S. Tool Co.....325-383-385
Jarvis Co., Chas. L.....15
Jefferson Machine Tool Co.....164
Johansson Div. (Ford Motor Co.).....255
Johnson Gas Appliance Co.....154
Johnson Machine & Press Corp.....383
Jones & Lamson Machine Co.....7

Kearney & Trecker Products Corp.....127
Kennametal, Inc. 53
Knight Machry. Co., W. B.....141
Knu-Vise, Inc. 241

L. & J. Press Corp.....339
L-W Chuck Co.....193
La Salle Tool Co.....321
Lassy Tool Company.....190
Leach Machinery Co., H.....73
LeBlond Machine Tool Co., R. K.....395
Leckinger Machine & Experimental Co.....200
Lee Co., K. O.....186
Lehigh Foundries 341
Lehmann Mch. Co.....33
Leiman Brothers, Inc.....176
Lenox Instrument Co.....172
Lewthwaite Machine Co., T. H.....313
Libert Machine Co.....365
Lift-Swing Fixture Corp.....134
Lima Electric Motor Co.....204
Lincoln Park Industries, Inc.....223
Linley Brothers Co.....327
Littell Machine Co., F. J.....332
Logan Engineering Co.....65
Lovejoy Flex. Coupling Co.....338
Lucas & Son, J. L.....246
Luma Electric Equipment Co.....332
Lyon-Raymond Corp. 162

M-B Products 214
McGill Manufacturing Co.....372
Machine Products Corp.....70
Madison Mfg. Co.....245
Madison-Kipp Corp. 297
Majestic Tool & Mfg. Co.....323
Mall Tool Company.....219
Maquoketa Company 25
Martin Designs, Inc.....228
Martin Machine Works, J. E.....216
Marvel Tool & Mch. Co.....247
Massasoit Machine Company.....168
Master Specialty Company.....328
Master Tool Co.....325
Maxwell Co., F. A.....206
Mead Specialties Co.....279
Meinhardt Diamond Tool Co.....334
Melling Tool Company.....310
Mercury Metal Die & Letter Co.....218
Metal Lubricants Co.....142
Meyers Company, W. F.....30
Michigan Chrome & Chemical Co.....188
Michigan Drill Head Co.....339
Midwest Tool & Engineering Co.....242
Miller Knuth Mfg. Co.....242
Millers Falls Co.....241
Milwaukee Chaplet & Mfg. Co.....307
Minn-Kota Foundry & Mfg. Co.....254
Modern Motor Drives Div.
(Nichols Eng. Co.).....260
Modern Tool Works.....87
Molina Ind. Diamond Co. of U. S.....128
Moline Tool Company.....378
Monarch Machine Tool Co.....138
Moore Special Tool Co.....74
Morey Machinery Co., Inc.....137
Motor Tool Mfg. Co.....269
Mummert-Dixon Company 220
Murphy & Co., James A.....337

National Acme Co.....23
National Machine Tool Co.....260-D
Nedco Company 347
Nelco Tool Co.....85
Neubert Machine Co.....357
New Albany Machine Mfg. Co.....296
New Britain Machine Co.....27
New Britain Tool & Mfg. Co.....260
New-Field Machined Parts Co.....102
New Method Steel Stamps, Inc.....262
Nichols Eng. Co. (Modern Motor Drives).....260
Nicholson File Co.....183-187
Nicholson & Co., W. H.....357
Nielsen, Inc. 262

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Norgren Co., C. A.....14
Norton Company.....260-B-C
Numberall Stamp & Tool Co.....152

Oliver Instrument Co.....31
Oliver Machinery Co.....306
Oliver Motorcraft Corp.....292
O'Neil-Irwin Manufacturing Co.....267

Paasche Airbrush Co.....324
Paddock Tool Co.....273
Parker Co., Charles.....226
Peninsular Chemical Products Co.....192
Perfex Gage & Tool Co.....66
Plunket Machine Co., J. E.....248
Plymouth Engineering Co.....351
Pope Machinery Corp.....91
Porter-Cable Machine Co.....103
Porter Machine Co.....244
Potter & Johnston Mch. Co.....301
Pratt & Whitney.....165
Printz Electric Co.....312
Procunier Safety Chuck Co.....389
Production Machine Co.....216
Producto Machine Co.....293
Prutton Machine & Tool Co., D. H.....156
Pyrometer Instrument Co.....246

Quality Tool & Die Co.....93

R & L Tools.....289
Racine Tool & Machine Co.....227
Rahn Granite Surface Plate Co.....345
Read Machine & Tool Co.....351
Reading Machine Co.....150
Reich Mfg. Co., J. R.....244
Reid Brothers Co.....77
Republic Drill & Tool Co.....401
Riley & Geehr, Inc.....290
Rivett Lathe & Grinder, Inc.....2
Robbins Eng. Co.....101
Rockford Clutch Div.....363
Rogers Mch. Works.....22
Roofe Machine Works.....88
Ross Operating Valve Co.....43
Rotor Tool Co.....61
Rouse & Co., H. B.....210
Rusnok Tool Works.....373
Ryerson & Son, Inc., Jos. T.....122

S & S Machine Works.....248
Sales Service Machine Tool Co.....153
San Angelo Foundry & Mchy. Co.....50
Sanford Manufacturing Co.....174
Schauer Machine Co.....48
Scherr Company, George.....12
Schmarje Tool & Engineering Co.....355
Schmidt Inc., Geo. T.....343
Schnacke Manufacturing Corp.....234
Schultz & Anderson Co.....341
Scientific Div. (Acme Industrial Co.).....349
Screw Machine Specialty Co.....282
Seneca Falls Machine Co.....97
Sentry Company.....78
Sheldon Machine Co.....287
Siewek Tool Div.....251
Simonds Saw & Steel Company.....21
Simonski, Gilbert S.....283
Skilsaw, Inc.....28
South Bend Lathe Works.....117
Springfield Machine Tool Co.....68
Stackbin Corporation.....379
Standard Gage Company.....173
Standard Transmission Equipment Co.....336
Stanley Works.....231
Staples Tool Co.....161
Stark Tool Company.....[illegible]
Starrett Co., L. S.....157
Stegee Machinery Co., W. L.....314
Stokerunit Corp.....129
Strand & Company, N. A.....208
Strand Manufacturing Co.....343
Stuart Industries, Inc.....296
Sturdimatic Tool Co.....199
Sturtevant Co., P. A.....203
Sundstrand Machine Tool Co.....47
Sunnen Products Co.....229
Super Tool Co.....63
Sutton Tool Co.....71
Syntron Company.....258

T. & H. Mfg. Co.....244-336
Tannewitz Works.....44
Taylor Co., B. A.....326
Taylor & Fenn Company.....288-335
Taylor Mch. Co.....264
Threadwell Tap & Die Co.....19
Thriftmaster Products.....377
Tomkins-Johnson Co.....96
Tool Supply Co.....264
Torit Manufacturing Co.....76
Torq Electric Mfg. Co.....64
Travers Tool Co.....363
Trindl Products, Ltd.....403
Troyke, Alfred A.....266
Turchan Follower Machine Co.....26
Turner Machinery Co.....69

U. S. Electrical Tool Co.....109
U. S. Hoffman Mchy. Corp.....243
Unique Manufacturing Co.....277
Universal Engineering Co. (Cal.).....216

Vanderwall Co., E. H.....280
Victor Machinery Exchange.....386-387-388
Vimco Mfg. Co.....345
Vonnegut Moulder Corp.....318

Wade Instrument Co.....244
Wade Tool Co.....215
Waldes Kohinoor, Inc.....89
Walker-Turner Co.....113
Walls Sales Corporation.....345
Walton Company.....130
War Assets Corp.....250
Wardwell Mfg. Co.....275
Weber Machine Corp.....373
Weldon Roberts Rubber Co. (Brightboy Div.).....171
Weschе Electric Co., B. A.....106
Western Tool & Mfg. Co.....266
Wheel Trueing Tool Co.....237
White Dental Mfg. Co., S. S.....143
Whitney Metal Tool Co.....314
Wiedemann Machine Co.....80
Willey's Carbide Tool Co.....355
Wilson, K. R.....75
Wirth & Son, Carl.....344
Woodworth Co., N. A.....393
Wyzenbeek & Staff, Inc.....155

Yohe Supply Co., Wm. S.....342
Yost Mfg. Co.....292
Young Arbor Company.....308

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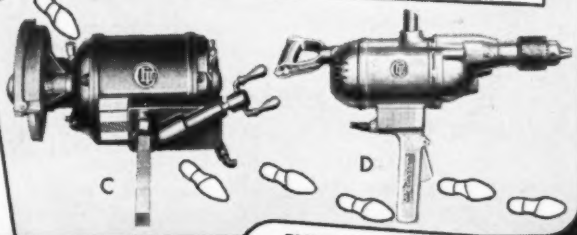

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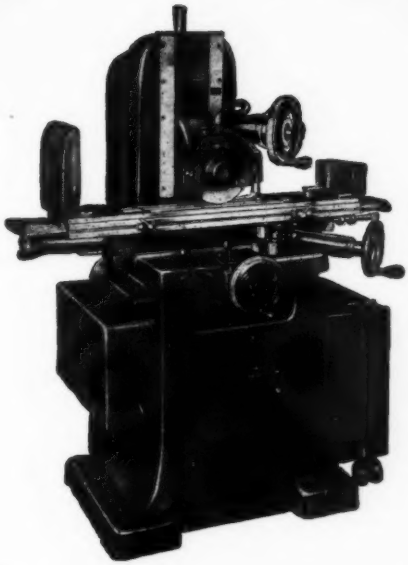

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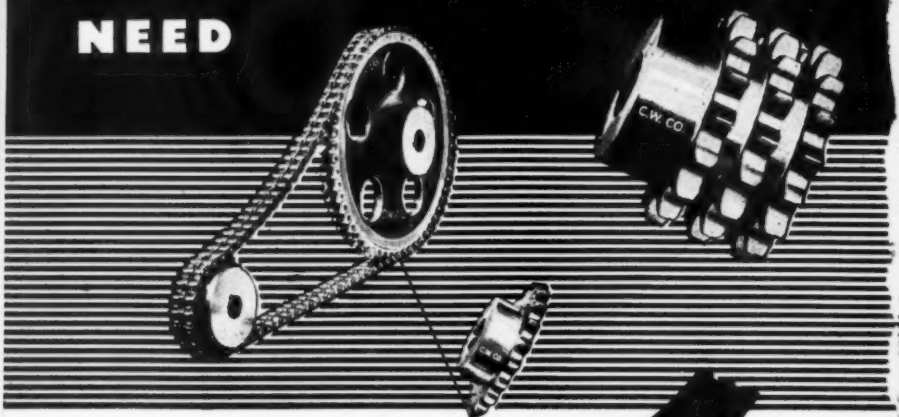

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